

# Contractors and Engineers Monthly

Vol. 41, No. 5

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## Highlights Of This Issue

### Access Roads

The construction or improvement of access roads to war plants and military establishments has been a major contribution to the war effort by the highway industry. Three types of access-road construction are described in this issue: three separate concrete-paving contracts to provide access to and from the shipyards at Mobile, Ala.; the widening of a series of bridges to carry the Overseas Highway to Key West is described in another of our series on this important route; and a pit-mixed re-tread on a widened base by state forces to improve a total of 13.8 miles of a highway serving an Army camp in Florida. See pages 1, 7, and 52.

### More on Equipment Care

Well-organized equipment-maintenance programs by both state and county highway departments are described in our series of articles to aid in keeping equipment on the job. These include the central garage and shops and a typical sub-district garage of the Indiana State Highway Commission, and the set-up for equipment care in Allegheny County, Penna. See pages 2 and 63.

### Harbor Improvement

A 5,000,000-cubic-yard dredging contract for the improvement of a Pacific Coast harbor, let before our entry into the war, was held up because of it and then resumed as an essential project because of the importance of the work to the war effort. See page 2.

### Seeding at Airports

No phase of airport construction is more important to the successful use of the field than the seeding or sodding operations, and yet this field of activity is comparatively new to many construction men. A detailed discussion of the organization and equipment needed for carrying out successfully the seeding operations at an airfield is presented in this issue. See page 11.

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C. & E. M. Photo  
Improving the entrance to Mobile.

## Rural Road Work In Burleigh County

### Five Commissioners Direct Road Work; Tax-Delinquent Land Leased or Sold to Help Budget of No. Dak. County

✦ BURLEIGH County, North Dakota, which has an area of 1,836 square miles and a population of less than 23,000, two-thirds of which lives in Bismarck, the capital and county seat, has 1,000 miles of roads to maintain and repair and does it, principally by the well-planned use of good equipment.

The County Commission consists of W. G. Worner, Chairman and Commissioner from the fifth district, Charles A. Swenson from the first district, H. J. Brownawell from the second district, A. E. Holden, from the third district, and Arthur Magnus from the fourth district. Four of these men are successful farmers, while Mr. Worner was formerly a banker at Oakes and County Treasurer of Richland County. All but one are serving their second term in office under a system whereby either two or three of the five commissioners are voted on every second year, to serve a term of four years.

In addition to managing all other affairs of Burleigh County, including an extensive program of rental and re-sale of tax-delinquent lands which will be discussed later, these men assume full responsibility for the repair, maintenance, and new construction of county and township roads. Much of this system has been built in the last four years as an important part of the program of placing delinquent lands back on the tax rolls, and new construction and improvement of the existing system is a continuous feature of their program.

(Concluded on page 12)

## Triple Access Roads Paved with Concrete For Shipyard Traffic

By THEODORE REED KENDALL,  
Editor  
(Photo on page 80)

✦ THREE separate access-road contracts forming a Y were completed last autumn by Ledbetter & Johnson of Rome, Ga., for the Alabama Highway Department to take care of the 6,000 to 8,000 vehicles per shift moving from the shipyards through Chickasaw, north of Mobile, Ala., via Telegraph Road and the Craft Highway into the city. These three concrete-paving projects, DA-NI-2B (1), DA-NI-4 and DA-NI-2, are not long, 2.7 miles, 2,550 feet and 1,590 feet, respectively, but they are vital connecting links which now speed traffic over widened highways.

### Features of Design

Telegraph Road was an 18-foot 7-6-7-inch concrete pavement scarcely suitable when the traffic was quadrupled. This project widened the road to 42 feet for the full 2.7 miles, the widening varying from a maximum of 22 feet with concrete curb and gutter on one side and only the curb and gutter on the other side to a uniform widening of 12 feet with curb and gutter on both sides.

The second part, DA-NI-4, is a connecting link from the junction of the highway leading to the Gulf Shipbuilding Corp. shipyards direct to the Craft Highway. An existing 18-foot concrete pavement was retained and widened on the outside with a 10-foot lane and curb,

### Ledbetter & Johnson Build Wider Highways for the Traffic from North into City of Mobile, Ala.

and 4 feet on the inside. A 4-foot median strip divides the northbound highway just described from the new 32-foot concrete southbound highway, also with a curb on the outside.

A third short contract, DA-NI-2, forms a 1,590-foot tail to the Y pointing northward and connecting with U. S. 43 and Alabama 5. It has the same design as the second contract.

### Grading and Forms

For the small amount of grading required for this work, the contractor used two 8-yard LeTourneau Carryall scrapers with D7 tractors, and for the work between the forms two Caterpillar No. 12 power graders. The form-setting crew consisted of four or five men as required to handle the Blaw-Knox 8-inch forms, keeping them set well ahead of the paver. A novel device was developed by the contractor for use in packing the earth beneath the steel road forms to insure ample support for the heavy finishing machine. One end of a pick was cut off entirely and the other shortened to about 8 inches and a triangle of reinforcing rod welded around the shortened pick in the shape of a widened mattock. This

(Continued on page 22)

### HIGHWAYS AT TWO LEVELS



Connection prevents interference of headlight beams on a dual highway at Beacon Falls by using old street-car right-of-way above, reinforced by an Armocon bit-type retaining wall, for northbound traffic while southbound vehicles use old Route 8 below.



# More About Equipment

## Eternal Vigilance Practiced in Indiana Keeps State Highway Machines Working

### Complete Control of Parts And Equipment Through the Indianapolis Central Garage Assures Economy

† THE maintenance of state highway equipment in Indiana is controlled by a careful index system in Indianapolis under the Maintenance Division and the Supervisor of Equipment. The Central Garage maintains the base stock of parts, which are distributed on requisition, after careful scrutiny, to the thirty-six sub-district garages. These local units each have small shops for maintaining the equipment working from them.

#### The Central Garage

The Central Garage is a 2 and 3-story brick structure 80 x 150 feet in plan, located two blocks west of the State Capitol and one and a half blocks west of the main offices of the State Highway Commission. It contains the office of the Superintendent of the Central Garage and of the Stock Clerk. The Supervisor of Equipment has his office adjacent to the Superintendent of Maintenance in the State Highway Commission offices.

In addition to the offices, the first floor of the Central Garage contains the stock room, with a shipping room for parts being sent to sub-district garages and a delivery window for parts being used from stock by the Central Shop. The major portion of the building is given over to the storage garage and the shop for the maintenance of equipment centered there.

#### The Parts Department

The Parts Department is located at one end of the building on the first and second floors, with a small automatic freight elevator running between the two floors. On the first floor are seven double rows and two wall rows of metal bins and shelves for stock and miscellaneous supplies and repair parts. A typed master index enclosed in cellophane is hung at the end of each bin to show the location of parts by bin or shelf number.

A perpetual inventory is maintained through a special card system. A "Central Garage Bin Card" is kept on each shelf or in each bin. This card shows the make of equipment and its part number

and name, and the section and bin in which it is located. In columns on the card are shown the date of a requisition, the order or requisition number, the shop or sub-district to which shipment is made, the initial of the man making the shipment, and then two columns labeled "In" and "Out" to show the number of units added to the stock in that bin or taken out, and the final column gives the balance in the bin. A set of master cards is maintained by a clerk in the Highway Commission's offices as a final check. The master cards are balanced daily from the shipping orders.

When a sub-district needs additional parts, it sends a requisition to the Equipment Supervisor, who checks to see whether the sub-district has a reasonable stock of these parts already or whether the requisition should be passed. When he has initialed it, he issues an order "To the Custodian of Material and Supplies" in quadruplicate on State Highway Commission Form A. D. 262, indicating the sub-district garage to which the delivery is to be made and whether by freight, express, parcel post, or for the sub-district to pick up at the Shipping Department.

(Continued on page 47)

### Bloomington Sub-District Garage Typical; Each Has Small Shop and Parts to Maintain Own Equipment

† THE field organization of the State Highway Commission of Indiana is by districts and sub-districts. There are six districts, each with six sub-districts. The maintenance of the roads and of equipment is centered in the sub-districts, each of which has a modern headquarters building for the offices, shop, and garage. The office of the District Engineer is adjacent to a sub-district headquarters, and the Superintendent for each sub-district also has his office in the sub-district headquarters building.

Most of the sub-district garages are built of brick from standard plans which are constantly improved as originally prepared by the architect of the Maintenance Division. The architect is also responsible for the upkeep of these buildings. At present, with all garages built, but with their maintenance more difficult, his work deals chiefly with this latter item. He checks the condition of all furnaces and heating equipment in

(Continued on page 26)

## Dredging Improves West Coast Harbor

### 5,000,000-Yard Contract With Some Material Moved Over 3 Miles Requires Auxiliary Pump, Large Pipe

By FRANK B. SARLES,  
Field Editor

(Photos on page 80)

† CONSTRUCTION has been resumed on a contract awarded in 1941 to the Standard Dredging Co. of New York by the U. S. Engineers for harbor improvements at a Pacific Coast port, and the work is progressing at a satisfactory rate. Much of the work now being done was planned as normal harbor improvement prior to our entry into the war and a contract for it was awarded, the execu-

tion of which was delayed by the war. Prior to resumption of operations additional features were included.

Plans provide for the opening of the mouth of a non-navigable river to improve drainage of a large inland urban area by dredging the channel 408 feet wide to an elevation of 15 feet below Mean Lower Low Water, while an adjacent beach roughly 3,500 x 4,500 feet in area which lay slightly above high tide is dredged to a depth of minus 30 feet with a 6 on 1 slope connecting the two. Material excavated is transported and used in the formation of four additional embankments needed for the improvement of the port facilities.

#### Dredge Los Angeles

The dredge Los Angeles used for the operation has an interesting past. Originally built and used by other companies as a gold dredge in the placer mining regions of north central California, it was purchased by Standard Dredging Co., dismantled, hauled out in small units over steep mountain roads, and rebuilt to greater size, equipped with new and larger machinery, and placed in ocean service by the contractor. As rebuilt, it has an all-welded steel hull 130 feet long, 44 feet wide, and 7 feet deep. The pump, made by the contractor, has a 27-inch suction and discharge although on this particular operation a 24-inch discharge line is used on the shorter movements of dredged material. The

(Concluded on page 17)

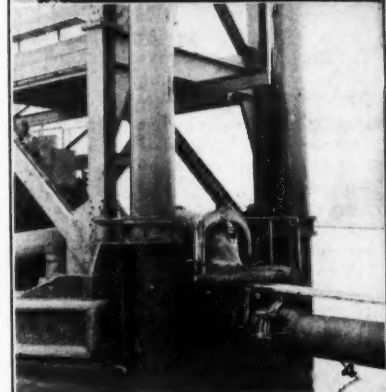
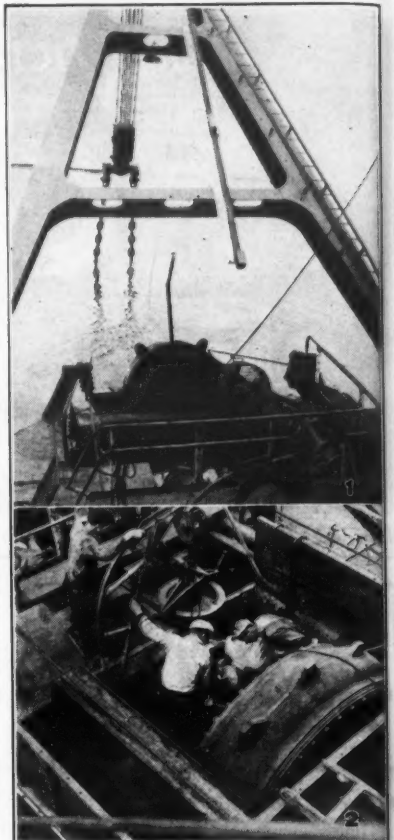
A West Coast harbor is improved by the dredge Los Angeles. 1. The cutter head motor and ladder as seen from the pilot house. 2. Inspecting the main pump through the cover plate in the 27-inch suction line. 3. Port side of the dredge Los Angeles showing the discharge line on the deck. 4. The stern spuds with the connection between the dredge discharge and the floating line. 5. An elbow in the floating line. 6. A Beebe hoist chained to the discharge line is used to hold the end discharge section of the shore line. 7. The discharge from the shore line.

U. S. Engineer Photos



U. S. Engineer Photo

Walking toward the dredge Los Angeles over the catwalk of the floating line, one notes the "strong-backs" between pairs of steel cylinders forming a pontoon, and ahead the cable barge at the left, the anchor barge at the right, and the auxiliary discharge line connected ready for use.



This te  
tractors  
absorb



# around and around . . .



Allis-Chalmers  
Photo

## . . . go these 18-TON TRACTORS on a Texaco-paved test track

This test track for 18-ton military tractors is paved with durable, shock-absorbing Texaco Sheet Asphalt.

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From Allis-Chalmers assembly lines, a steady stream of powerful 18-ton military tractors go through their paces on this Texaco Asphalt test track near Springfield, Ill.

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# TEXACO ASPHALT



# Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING  
CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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## Questionable Protection To the Post-War Home Front

The legislature of the State of Washington has taken a step which, should it become epidemic among the sovereign states of this country, would create a very real bottleneck in interstate trade in the construction industry. The Washington law requiring that any contractor being paid with state funds must employ 95 per cent of his outfit from Washington residents, defined as those who have lived 90 days within the state, simply means "Out-of-state contractors not wanted".

With the usual narrow outlook that results in such legislation, the state politicians think they are protecting their residents, hundreds of thousands of whom have come to the state from elsewhere to work in the shipyards and other war industries, have purchased homes, and have let it be known that they intend to continue to be Washingtonians after the war. It is this great new population about which the politicians are worrying, as the shut-down of

war industries will place a great burden of reemployment among remaining industries and on public works.

The other side of the picture is the restriction of competition. Perhaps the state of Washington has an overabundance of contractors who will build her post-war dams, hydro-plants, bridges and highways, but there is still the chance that outside contractors will have particularly efficient organizations enabling them to do the work at far lower cost. This would mean that the public funds available would not build as large a volume of public works, because the great boon of free enterprise—competition—would be lacking to keep costs to the minimum under the contract system.

Washington has raised a new kind of barrier at her borders, a restrictive act which can only react to her own disadvantage. It is to be hoped that other states will not follow her lead in this backward step.

## Post-War Projects Need Not Be Colossal

The post-war program of needed public works construction projects has been considered by many officials of state, county, and municipal boards to be made up solely of work in the million-dollar bracket. However, small but sorely needed public works projects in the aggregate will serve the employment needs in a far wider circle than a single \$100,000,000 irrigation, dam or highway project.

We gaze in wonder at the aggregate sums to be expended on "public works" in the post-war period, just as we might marvel at the hard-packed stretch of Daytona Beach, but we forget that the beach is made of countless grains of sand fitted together to form the support for great racing cars as well as the family automobile. Similarly, the need is for the completion of contract plans for hundreds of thousands of post-war projects, to cost \$5,000, \$25,000, \$50,000 and \$100,000, which together will support the economic fabric of the nation, give business to a great number of small local contractors, and provide employment for labor in its own home town.

The wail comes to us from county and town, as from the state highway departments, "Where will we get engineering personnel to make the contract plans? Our young engineers left us for war plant jobs or Uncle Sam has taken them." All that is true, but many of them turned out to be 4F's, over-age for the draft, have been released by contractors, and there is a vast reservoir of older men who will be glad to return to the drafting board. All of these sources have been tapped by the ingenious de-

partments; Indiana is using engineering students from Purdue for the elementary designs, thus releasing the more experienced men for more complicated work.

The rapidly increasing number of men discharged from combatant units, casualties who want and need to carry on again in civilian life, include many engineers from the Navy Seabees, Army construction units and the Marine Corps. Get in touch with your Naval District Headquarters, the Army Service Command of your area, the U. S. Employment Service, or Veterans Service Center to find how and where you can offer employment to these men.

Bring together the available engineers and the project plans for large and small jobs. Swell the volume of contract plans ready to go on A-day, V-day, any day the WPB releases materials, or the need for the stabilizing effect of public-works construction is indicated. Be ready! Let's not again have too little, too late!

## Panama Plans Paving For National Highway

The Ministry of Health and Public Works of the Republic of Panama has announced plans for the paving of the National Highway, according to a recent report. Already about 80 miles, between Panama City and Rio Hate, have been paved with concrete, and concrete surfacing is to be continued as far as Sona in the Province of Veraguas, 190 miles from the capital. Concrete or asphalt will also be used to pave a link of 308 miles to David.

## U. S. Highway Policy In Central America

There has been considerable discussion about the Inter-American Highway through Central America, on which work on gaps not otherwise provided for was undertaken as an emergency project by the U. S. Engineers and which phase has now been abandoned as no longer necessary. The discussion has also concentrated on the fact that work on this route to Panama has been and is now being carried on under the supervision of the Public Roads Administration. There are some who believe that the United States should now drop all interest in and financial assistance to a continuation of the project, while others believe that it is more important than ever as a part of the Good Neighbor policy. Still others have been aroused by an announcement that work would continue by force account.

In order to clarify the situation, we have secured from the Inter-American Regional Office, Public Roads Administration, of which E. W. James is Chief, a statement on its present policy.

It is pointed out that there has been no change whatever in the manner in which the work in Central America, which is under the supervision of the Public Roads Administration, is being handled and no change is contemplated. In Costa Rica the work now under way on the Inter-American Highway is being handled by contract. There is also a contract of some size for bridge construction which includes work in several countries.

In El Salvador, highway work, except for the erection of large bridges, is handled by force account and Nicaragua has also for some years done its highway construction by this method. The same is true of the work on the Inter-American Highway in Honduras, except for the construction of large bridges. At present, no work on the Inter-American Highway in which the Public Roads Administration is concerned is going on in either Panama or Guatemala.

It should be remembered, in discussing the various aspects of this project, that the construction of the Inter-Amer-



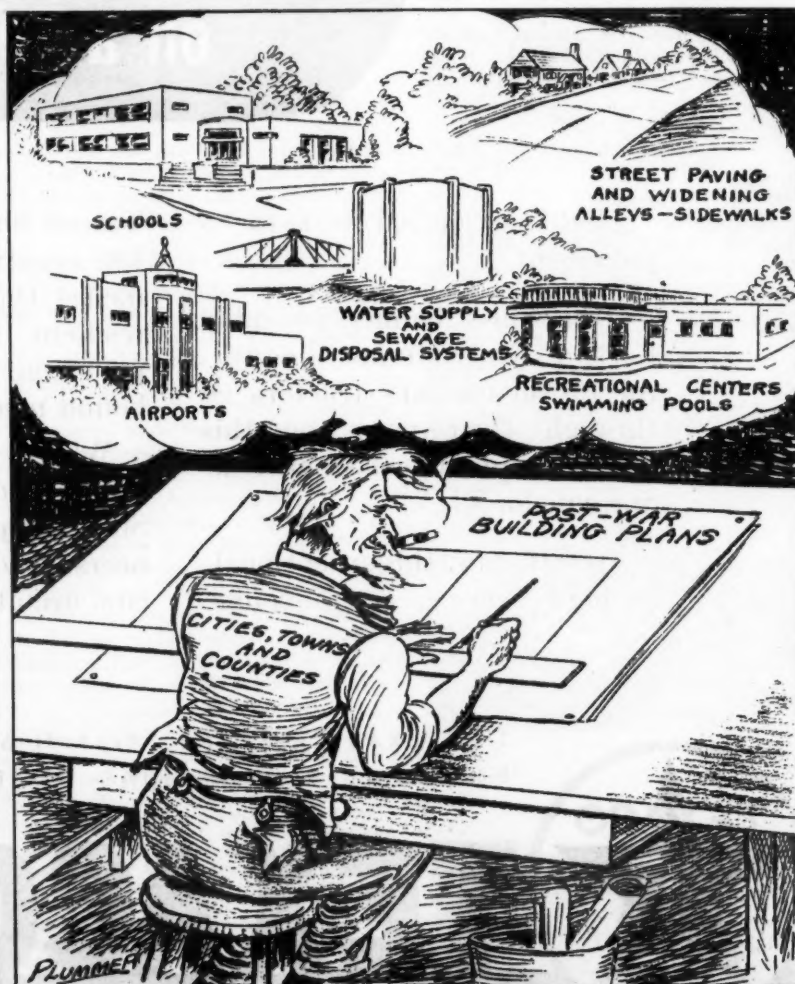
"So many people wanted to know what we're doing."

ican Highway is a cooperative undertaking. As the cooperators are independent countries, it should be apparent that the manner in which work within their borders is to be conducted involves decisions in which their preferences have a dominant influence. The statement concluded, "It should be added that we have had very little reason to question the soundness of the decisions mutually reached in regard to this matter, results having in all cases completely confirmed the soundness of these decisions".

## New York Highway Bills

Early in April, two new bills which will greatly facilitate the planning of post-war highway construction became law in New York State. The first bill shifts to the state all cost of rights-of-way outside of cities, the cost of which was previously paid by the counties. Under the new law, however, county boards of supervisors are given a veto power over state plans for highway relocation which involve a mile or more of construction.

Under the second law the state is to pay the cost of planning arterial highways in New York and other cities. The statutes leave to future legislatures the authorization of state aid to cities for construction and care of such roads.



Courtesy, Producers Council Inc.



# PAGES from an ENGINEER'S Notebook

## ABOUT THE SEAMAN PULV MIXER

Hundreds of these operators are using the SEAMAN Pulverizer. Some tractor-operated models are available for farm use on farm allocation. Write to Seaman Motors for information about the SEAMAN MIXER in agriculture.

Checked work of soil pulverization prior to soil-cement stabilization. Results OK'd after two passes with the SEAMAN MIXER. Pulverization better than specifications.

Job: Emergency drying of gravel emulsion base course. Procedure: Sudden rain fell before compaction. Contractor put SEAMAN MIXER on job, operating with hood open to disperse and dry materials. Moisture reduced 50% in the first pass. Job OK'd after second pass. Contractor figured SEAMAN MIXER saved him \$10,000!

Job: Scarifying and pulverizing old road bed and re-mixing with cement. Procedure: Old road scarified (motor patrol) and pulverized by use of SEAMAN MIXER. After fine pulverization and surface shaping, - normal soil-cement operations followed, using SEAMAN MIXER for dry and damp mixes.

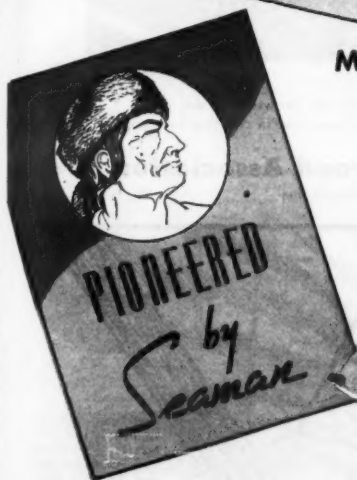
Job: Reconstruction of highway badly washed. Procedure: Scarified first, - then pulverized in place with SEAMAN MIXER. Next 1 1/2 inches of subgrade material added to mix. Subgrade material obtained and simultaneously mixed by operating SEAMAN MIXER 1 1/2 inches below the mat.

Job: Mixing in resin as a waterproofing agent in area where water table was close to subgrade. Seaman Mixer operated after grade to pulverize soil. Resin mixed in place with two Seaman Mixers working in sequence. Compaction with sheep foot and rubber-tired roller.

Job: Asphalt center strip between double concrete highway. Procedure: Trees and stumps cleared and top soil stripped on nearby area. Surface grade leveled on area and oil distributed. SEAMAN MIXER used for in-place mixing. (hood open) in preparation for removal to highway center strip where asphalt was laid in 6" lift for initial rolling. Cycle repeated in mixing additional material.

A contractor friend is using a SEAMAN MIXER on his farm for tilling. It does the work of plow, disc and harrow, - and in one tractor-trip. Hence the finest seedbed I've ever seen. I watched the SEAMAN work in a field of corn stalks. One pass and the field was ready for seeding.

MODEL MHD-72



NEW, 1944 edition of "Soil Stabilization Methods" is off the press! Ask for Bulletin 2.

**SEAMAN MOTORS**  
MILWAUKEE WISCONSIN





One of the new P &amp; H truck cranes.

### Carrier Is Feature Of New Truck Crane

Entirely new design in which the carrier is built for crane work, not for crane transportation alone, and increased efficiency and mobility are features of the new P & H truck crane recently announced by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee 14, Wis. A lower center of gravity gives greater stability in terms of hoisting capacity and boom reach, without the use of outriggers; with outriggers, the working range is proportionately increased and, being built closer to the ground, the outriggers require little blocking. The usual problem of sway at the boom point is lessened by a new weave-proof frame of all-welded box-section construction with a built-in torsional bar. The entire unit is within standard road clearances, and its comparatively short wheelbase allows greater maneuverability on the highway as well as on the job.

The crane machinery is a standard P & H Model 255-A crane upper, complete with P & H low-pressure direct-acting hydraulic control and triple-safe planetary boom hoist, which prevents the boom from falling suddenly. Operation is by either gasoline or diesel power, and is entirely independent of the carrier power. Tractive power is by double-drive axles in tandem, and low-range transmission with ten speeds forward and two reverse gives greater pulling power, the manufacturer states. Steering is made easy by double cam and roller bearings with 21 to 1 ratio, and eight large rear tires provide low ground pressure. All air lines, tanks and the braking system are completely protected against damage and yet are fully accessible.

Further information on this new P & H truck crane may be secured by those interested direct from the manufacturer by mentioning this item.

### Texas Road Problems Discussed at Hearing

The Texas Good Roads Association, whose sole objective is to prevent the diversion of highway-user taxes to non-highway purposes, recently presented a statement on Texas highway problems before the House Roads Committee, urging that the Committee write into the new Federal-Aid bill and into all other highway legislation the strongest provisions against diversion.

The Association's statement pointed out that Texas has a historical diversion, due to a constitutional provision which directs that one-fourth of all occupation taxes be credited to the free school fund. Since the gasoline tax was originally levied as an occupation tax, from its inception one cent of the gas tax in

Texas has been diverted to non-highway purposes. This diversion occurred before the organization of the Texas Good Roads Association.

Reporting on the present financial condition of Texas, it was stated that, in anticipation of the post-war period, the Highway Commission has very wisely conserved its funds and has \$25,000,000 in Treasury war certificates. The state's general revenue fund is not in so healthy a condition, however, and has a deficit of some \$20,000,000. It is now

being urged by some Texas citizens that the highway fund be raided for the benefit of the general fund, to take the form of a "loan" for which the highway fund would be given a warrant on the general fund. The Good Roads Association regards this as a serious threat to the future highway program in Texas.

Texas is one of the key military states of the nation. There are in training there several hundred thousand troops and many air establishments, both Army and Navy. The Association feels that Texas highways have been of immeasurable benefit to the entire nation in the prosecution of the war, and points out that had they been in a little better condition, they would have rendered even greater service. For this reason, it is felt that a considerable outlay of funds for roads in Texas is justified, in addition to the other normal peace-time considerations attached to highway construction and usage.

The Association went on record as being in complete harmony with the plans for a post-war highway program in Tex-

as, and filed with the House Roads Committee a resolution adopted unanimously by the Texas Legislature endorsing the program; a resolution passed by the League of Texas Municipalities and one passed unanimously by the Texas County Judges and Commissioners Association, giving the proposal their approval.

### I-P Tool Co. Officers

The Independent Pneumatic Tool Co., Chicago, Ill., has announced the elections of Neil C. Hurley as Chairman of the Board of Directors, and of Neil C. Hurley, Jr., as President of the company, at its annual meeting. The younger Mr. Hurley, during the twelve years he has been associated with the company, has served successively as Manager of the Electric Tool Division, Secretary, Vice President and Executive Vice President.

Other officers elected to the Board of Directors were Edward G. Gustafson, Treasurer, and John McGuire, Secretary.

## For the best possible concrete surfaces - - use



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• For your essential jobs today—and for all post-war construction—specify Plyform, the Douglas Fir Plywood made especially for concrete form work.

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• Manufactured in strict accordance with U. S. Commercial Standard CS 45-42, Plyform is made with premium-grade water-resistant glues. Every panel is smooth-sanded, oil-treated and edge-sealed at the mill. Every panel serves as sheathing and lining combined. Write for free technical booklet—today.



Above: Flowing concrete lines distinguish this modern school building — "PLYFORMED" throughout.

Right: The versatility and adaptability of PLYFORM can be seen in this actual "on-the-job" close-up.



Douglas Fir Plywood is now available only for essential war use. • • • After Victory, this Miracle Wood will serve you in countless new ways.

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Tacoma 2, Washington •



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**DOUGLAS FIR PLYWOOD**

*Real Lumber*

MADE LARGER, LIGHTER  
SPLIT-PROOF  
STRONGER

GENUINE DOUGLAS FIR

**PLYFORM**

Concrete Form Panel

D. F. P. A. INSPECTED

You can quickly identify Plyform by its distinctive green edge seal and by this diamond-shaped "grade trade-mark."



# Old Arches Utilized For Overseas Highway

**Narrow Roadway on Former  
Railroad Spans in Florida  
Widened to 22 Feet on  
Cantilevered I-Beams**

(Photos on page 80)

♦ A MAJOR item in the rehabilitation of the Key West Overseas Highway was the widening of nineteen bridges, aggregating 20,948 linear feet, connecting twenty separate Florida keys, and scattered over a distance of 24 miles. A contract for this work was awarded to Cleary Brothers Construction Co. in 1942. Although the difficulty in obtaining steel delayed operations materially, the work was completed in 1943.

When the Florida East Coast Railroad decided to abandon its line to Key West rather than repair the extensive damage done by the hurricane of 1935, it left intact, except for rails, a very considerable mileage of undamaged roadbed, including many miles of filled-spandrel concrete-arch bridges, having spans of from 21 to 30 feet and a width of 13 feet. It was promptly realized that these bridges could be utilized in the construction of a much-needed highway to Key West, and before 1939 the Overseas Road and Toll Bridge District, under the direction of B. M. Duncan, Engineer and Manager, had completed the widening and paving of a considerable number of them, aggregating 13 miles, as well as the construction of 18.1 miles of roadway. The remainder of the 140-miles between Florida City and Key West consisted of rough, narrow, and poorly aligned county pavement and 5.8 miles of narrow wooden bridges having an inadequate load limit, except for 1.6 miles of roadway and 0.9 mile of bridges which had been constructed by the Florida State Road Department prior to 1936.

With our entrance into the war, an adequate highway connecting Key West, a vital defense area commonly known as the "Gibraltar of America", with the mainland became not a convenience to be desired but a military necessity. Plans for the completion of the entire project were formulated, and all portions of the work on which satisfactory

bids could be obtained were placed under contract. One of these contracts was with Cleary Brothers Construction Co. of West Palm Beach for the widening of nineteen of the bridges to furnish a 22-foot roadway. The procedure followed was to notch the old spandrel walls and place transversely in the notches I-beams 28 feet 8 inches long, which serve as support for the widened floor system.

## Setting the I-Beams

The 14-inch 43-pound wide-flange I-beams, 28 feet 8 inches long, were shipped by rail from the Virginia Steel Co. at Birmingham, Ala., to South Miami, Fla., and from there by barge to the contractor's plant at Niles Channel. They were then given a protective waterproofing treatment, and further dis-



C. & E. M. Photo  
Wood needle beams attached to the ends of 28-foot I-beams supported the curb forms for widening the nineteen bridges on the Cleary Bros. Construction Co. contract on the Key West Highway in Florida.

tributed to the points of use by the contractor's truck, which was equipped with a light-weight made-on-the-job power-driven crane for easy handling of the

beams.

The protective treatment consisted of an initial cleaning with sand blast and  
(Continued on page 30)

## the facts about **FINEGRADING** are . . .



No other existing equipment can prepare sub-grade as quickly, cheaply and accurately as Buckeye R-B Power Finegraders.

THERE is ample evidence based on pre-war road building jobs when time and money were uppermost in contractors' minds and on forced draft war jobs where time assumed a new and strategical importance, that Buckeye R-B Power Finegraders should be considered an essential part of every paving outfit. They offer these benefits: ability to cut the grade to accurate cross section, eliminating excessive loss of yield in slabs that are too thick and avoiding penalties due to slabs being too thin; ability to handle a heavy burden permitting faster, less accurate rough grading; speed that has been shown sufficient in some jobs to keep the grade out ahead of two double drum 34-E pavers working in tandem.

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## LOOK AHEAD

It has been estimated that every \$100,000,000 invested in road construction creates \$315,602,700 in business transactions. According to the American Road Builders Association, the United States needs a \$3,000,000,000 postwar road, street and highway program to meet automotive transportation needs . . . 10 billion dollars of business activity! Here is an important source of jobs for soldiers and war workers when Hitler and Tojo go down. Highway officials, contractors and dealers can help put this program over in their respective cities, counties and states.



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# Paving Landing Area At Navy LTA Station

## Emulsified Asphalt Used In Plant-Mix with Local Material; Laid During the Winter; Unusual Methods

† APPARENTLY defying weather, drainage conditions and previous practice in asphalt paving, the U. S. Navy completed the paving of 596,000 square yards of landing area and runway at a Lighter-Than-Air Station, using pit-run local sand and emulsified asphalt, and laying the entire mat in approximately two months during an unusually wet winter season in that section. Despite no provision for drainage, work proceeded successfully and the mat is strong, smooth and devoid of breaks or other imperfections after hard usage.

The area on which the large landing mat was laid contained several muck pockets which were cleaned out by drag-line and backfilled with the sandy local soil, all of which passes a 10-mesh sieve and is all retained on a 200-mesh sieve with 80 per cent between 40 and 80-mesh.

In the grading of the area no provision was made for drainage by the construction of subsurface pipe lines or surface ditches. The ground was, however, graded to slope uniformly to the south and also from a crown to the east and west to free the mat from surface water. Drainage from this area passes into the adjoining sandy ground without washing at the edges of the mat.

### The Mixing Plant

The mixing plant for this project, which required the production of approximately 88,700 cubic yards of sand-emulsified-asphalt mix in the working days available between November and February, consisted of a pair of Barber-Greene continuous mixing plants with the driers eliminated, set up near the area to be paved. All of the material for the mix was secured from one pit within the reservation and hauled to stockpiles adjacent to the mixers by LeTourneau Carryall scrapers. This sand had from 4 to 8 per cent moisture.

The two Barber-Greene mixers, one powered by a diesel engine and the other

by an electric motor, were fed from the stockpile by Barber-Greene loaders. The sand was moved close to the loaders by tractors and bulldozers to maintain uniform production by the plants. The mix was produced with 7½ per cent of Bitumuls emulsified asphalt and at the end of the mixing screw 1½ to 2½ per cent portland cement was added for dehydration.

The emulsified asphalt was stored in a wooden tank built in a novel manner near the plants. The site was excavated 5 feet below ground and a wood floor of tongue-and-groove lumber laid and sprayed with the emulsified asphalt to make a tight bottom for the tank. Then sides of the same material were built up and backfilled with sand on the outside for structural support and a tank for

100,000 gallons of asphalt was thus produced for a cost of \$1,200. The tank was roofed over with a light framework.

The two mixing plants were operated continuously for 12 hours a day and then one was operated through the night, stockpiling the mix from the night operation for spreading the next day. In this manner they were able to produce 4,000 tons of the sand-emulsified-asphalt mix in 24 hours. During the morning, the stockpiled material was loaded to trucks by a Barber-Greene loader and carried to the paving site of the day. By running one mixer 24 hours and laying off the other, there was time to make minor adjustments to the machine not operating and thus push the job through with the expected speed.

### Laying the Mix

During the day the paving material was loaded direct from the mixers to trucks and hauled to the point of laying. The loads were dumped between 2 x 6-inch form boards laid to control the grade only, as the material was spread

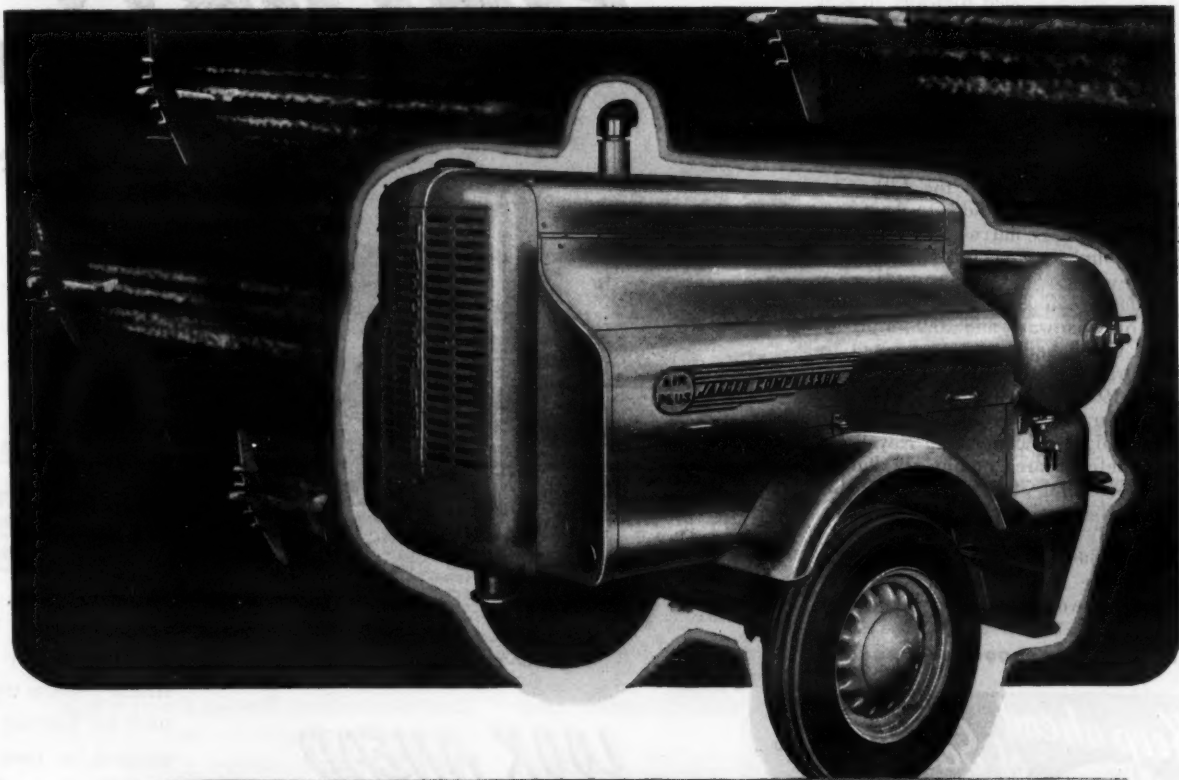
loose 5 inches deep which compacted to 4 inches for the finished mat. The material was spread by power graders to the required thickness and compacted by rubber-tire rollers. To finish off the surface after the form boards had been removed, the top 2 inches was worked by the power graders to an even surface after harrowing lightly with disk harrows. The entire area was then compacted by the rubber-tire rollers.

The same mix was used on roads throughout the reservation, laid 6 inches thick, compacted, and identical finishing methods were employed. After two or three months of heavy traffic the surface of the roads was reworked in the same manner as the original finish and shaped to crown and grade by power graders.

### Personnel

This work was done by contract awarded to Shepherd & Griffin Construction Co., general contractors, under the direction of Lieut.-Commander L. G. Lloyd, (CEC) USN, Officer-in-Charge of Construction.

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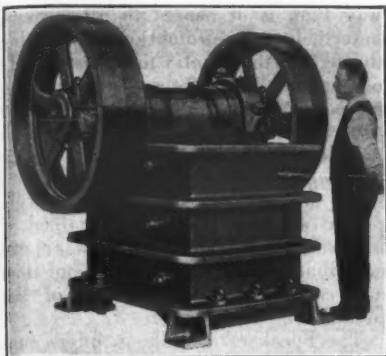
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The new Telsmith 18 x 32-inch roller-bearing jaw crusher.

## A New Telsmith Line Of Big Jaw Crushers

A new line of nine sizes of roller-bearing jaw crushers with capacities ranging from 5 tons to over 300 tons per hour has been announced by Smith Engineering Works, 4014 N. Holton Street, Milwaukee 12, Wis. The first of this new line of Telsmith crushers is an 18 x 32-inch size which is expected to have a wide demand. This crusher, as well as another new machine larger than the present 25 x 36-inch crusher, will complete the line.

Smith Engineering Works has made a long and careful investigation of merits of welded-steel-frame construction for overhead eccentric jaw crushers and has decided that its regular standard cast-steel frame and swinging jaw construction is better from the standpoint of the owner or user. With heavy steel castings, such as used in all models of Telsmith crushers, there is no chance for weaving or cracking, with the possible misalignment of bearings or other parts. With a solid cast-steel frame and swinging jaw properly annealed, this company believes there is the least chance of any kind of trouble. It is true that welded-steel-frame crushers are easier and less expensive to construct from a manufacturing or production standpoint, but Telsmith believes that the owner will get more for his money in lower upkeep during the longer life of the solid cast-steel crusher.

Full details regarding the new line of Telsmith roller-bearing jaw crushers may be secured direct from the manufacturer by mentioning this item.

## Rising Production Of Dirt-Moving Units

In line with the new War Production Board policy of wider dissemination of data which industry can use in business analysis and planning, announcement was made recently of the total shipments of angledozers, bulldozers, and graders in 1943.

Shipments of angledozers and bulldozers, which are playing a vital part in military operations in all combat areas, have been increasing steadily during the past year and a quarter, and in 1943 amounted to 16,100. Fifty per cent more 'dozers were shipped in the fourth

quarter of 1943 than in the same period of 1942.

The eighteen companies which made shipments of 'dozers in 1943 accounted for approximately 99 per cent of the total production of this machinery. Figures on shipments and unfilled orders for this type of equipment, including not only angledozers and bulldozers, but graders, roadbuilders, trail-builders, treedozers, brushcutters, root cutters, pushdozers and others, are given in the following table:

Year and Quarter	Shipments	Unfilled Orders* (End of Quarter)
1942 4th	2,960	5,210
1943 1st	3,480	9,910
2nd	3,930	11,290
3rd	4,120	14,490
4th	4,580	13,010
Total	16,110	.....

Graders shipped during 1943 exceeded 5,300, a decrease in comparison with the 1937-1941 period which, however, included more of the smaller sizes whereas 1943 production was restricted to the larger sizes to meet the constant demand of the military agencies. The 1,400 graders shipped during the fourth

quarter of 1943 was more than double the quantity shipped during the corresponding period in 1942, and unfilled orders at the end of 1943 were almost 70 per cent higher than at the end of 1942. The following table gives comparative figures:

Year and Quarter	Grader Shipments	Unfilled Orders (End of Quarter)*
1937 Total	7,560	.....
1939 "	5,580	.....
1941 "	7,560	.....
1943 "	5,320	.....
1942 4th	640	2,880
1st	960	4,400
2nd	1,450	3,900
3rd	1,460	4,960
4th	1,450	4,800

\*Figures supplied by the Construction Machinery Division, War Production Board, Washington, D.C.

These figures cover self-propelled motor graders for highway and airport construction and maintenance and for snow removal, tractor-drawn elevating graders for loading and hauling, and blade graders which may be pulled by tractor or truck, although the motor graders account for approximately two-thirds of the total grader production. Of the nine companies manufacturing graders in 1941, eight are at present making

shipments and it is estimated that they account for practically all grader production since 1937.

## New Conveyor Catalog Depicts Manufacture

The construction of Robins materials-handling machinery, from preliminary plans to the final step of erecting the machinery ready for service, is shown pictorially in a new catalog. It includes photographs of the foundry, where all sizes and shapes of castings are turned out, the machine shop with its massive machines for boring, milling, gear cutting and similar operations, and the structural steel shop where welding and riveting take place, as well as individual machine parts and the completely assembled equipment. The preface of the catalog tells an interesting story on how the present-day type of belt conveyor came to be made.

Interested contractors and engineers can secure copies of the catalog from Robins Conveyors, Inc., Passaic, N.J.

# CHALK OFF ONE MORE Special Delivery FOR A MOTO-CRANE

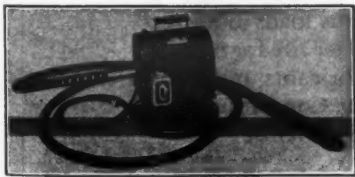
**LARGEST "LOUDSPEAKER" IN ITALY**  
A Lorain Moto-Crane swings the barrel of a 240 mm. Howitzer into position for mounting, on the Cassino front.  
— U. S. Signal Corps Photo from Acme

LORAINS were never meant to do jobs like these and we hope when this is over they'll never have to do them again.

Sure, they'll do jobs like this in topnotch style, but they're even better on the kind of jobs you'll be doing after the war. And because of their war-time experiences, improvements and developments, they'll be equipped better than ever to serve you profitably.

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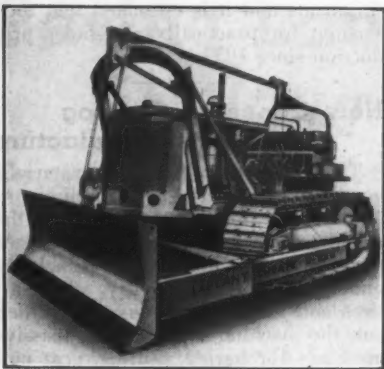
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# thew Lorain MOTO-CRANES

CRANES • SHOVELS • DRAGLINES





A new trailbuilder.

### A New Trailbuilder For Post-War Jobs

Another post-war earth-moving unit has just been announced by the La-Plant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. This is the cable-operated Model R-82R trailbuilder which is designed for use on a Caterpillar D8 tractor.

This new unit retains all the structural features of this company's line of bulldozers, including welded steel construction, box channel frame, box plate blade, pressed and formed sections. The cutting edge has been reinforced with more bolts, compared with earlier models, while the cutting bits at either end of the blade are single plates formed to fit the blade ends for greater wear resistance in rock cuts. The front overhead is a new design for increased strength and better appearance.

The feature of this new trailbuilder is its simple and positive operation, the manufacturer reports. The three-position blade can be positively angled either to the right or the left, or held in straight bulldozing position. Either end of the blade can be tilted up or down with a variation of 14 inches while in the straight bulldozing position, as well as when the blade is in either angling position. This is accomplished quickly by pulling two pins. The blade can be raised a maximum of 50 inches, or dropped 72 inches below the ground line. The unit is powered by a single cable and a Caterpillar double-drum power control unit.

Further information on this new earth-moving unit for use on post-war construction jobs may be secured by interested contractors and engineers direct from the manufacturer.

### Grade Separations Ease Traffic Problem

In the interest of greater safety at the intersections of the Belt Railway with two important traffic arteries in Chicago, railroad grade separations have been constructed to relieve congestion at the half-mile bottleneck which existed at each crossing. The two highways, Cicero Avenue (Route Ill. 50) and Pulaski Road, were paved to a four-lane width but the roadway was carried over the railroad on narrow viaducts with pavements only 20 feet wide. The location of a large war plant in the vicinity so increased the flow of traffic that the narrow-roadway viaducts were completely inadequate.

The first problem was to carry on the new construction without interrupting

traffic to and from the war plant. This was met by building a new structure alongside each of the existing viaducts, as well as new 24-foot pavement on the approaches to the new structure, separated from the old pavement by a central parkway. Each project included a highway grade separation with ramp connections at a cross street which affords a principal means of access to the plant. Four traffic signal installations were included on the Cicero Avenue project.

The Cicero Avenue viaduct has ten spans, is 635 feet long, and the design provides for expansion of the present single 28-foot roadway to 40 feet, and for the eventual replacement of the old structure with a new one with a 40-foot roadway. The Pulaski Road viaduct is a seven-span structure, 320 feet long, and is designed to permit replacement of the old structure with a new one with a 28-foot roadway in time. Both viaducts are of reinforced concrete, and the highway grade separation structures carrying the cross street over the highways are also

of reinforced concrete, and are of rigid-frame design.

Construction began April 15, 1943, and was completed by December 11. The work, which was divided into six individual contracts, was financed entirely by Federal funds because of its importance in the war effort.

### Speakers' Handbook Covering ARBA Plan

A sixteen-page Speakers' Handbook prepared primarily for the use of those who are speaking on the American Road Builders' Association Post-War Highway Plan has been issued for distribution to those interested in engaging actively in the campaign. The Handbook, originally issued in mimeographed form, created such a demand that it was enlarged and printed to permit wider usage.

In discussing the need for this book, Charles M. Upham, Engineer Director, said, "While the ARBA Post-War High-

way Plan is of benefit to all citizens, nevertheless the promotion of the plan throughout the country must rest largely on the shoulders of those directly connected with the highway industry and profession. A great deal of interest in the plan has been obtained from outside the highway field. From the results already achieved, it is clear that a wide public acceptance can be obtained if highway leaders in every community contribute a reasonable measure of time and energy to the promotion of the plan."

The Speakers' Handbook offers suggestions for speakers, ideas on arranging for speeches, and a comprehensive presentation of useful facts. The main body of the Handbook contains speeches of two minutes, five minutes, fifteen minutes and thirty minutes in length.

Copies will be mailed upon request to individuals who are willing to participate in the needed promotion work. Address your request to ARBA headquarters, at 1319 F Street, N. W., Washington 4, D. C.



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# Seeding Suggestions For Better Airports

## Character of Soil, Selection Of Equipment, Organization, Fertilizer, Seeds, and the Effects of Weather

By FRANZ A. AUST, Consultant,  
Madison, Wis.

THE advent of the airport as a large and active field of construction has brought with it many new operations. Just as early highway work was based upon engineering experience in railroad construction, so have the methods of airport construction been based largely upon previous experience in highway work. This applies not only to the extensive grading operations but also to the handling of concrete and bituminous material. With these and the problems of drainage, lighting and watering systems, the engineer is familiar. But the preparation of the ground for and the actual seeding and sodding are new and unfamiliar. It was first assumed that any farmer could take care of seeding, and consequently the low farm prices for such operations were reflected in some of the low bids.

No phase of airport construction is more important to the life of the motors of the planes using the field than successful turfing of adjacent land. For example, the turfing of a dusty airfield in Texas, at first considered "too fancy" an operation, resulted in extending the lives of engines from 300 to 2,100 hours, saving six overhauls at \$1,500 each. For this reason, seeding and turfing operations must be handled competently.

Seeding operations can be reduced to engineering terms, and are best handled by one with engineering experience. This, of course, must be combined with a general knowledge of agronomy and ecology. The nature of the soil, the grass-seed mixture specifications, the type of fertilizer to be used, the function of lime in the growth of plants—a knowledge of all these is essential to the successful completion of the job. And quite as important is a knowledge of tractors, ways and means of employing the multiple hitch, whether tandem or abreast, the capacity loads of different types of equipment and the kind of equipment best adapted for the soil at hand. These are agricultural engineering problems, but problems in which the construction engineer can soon feel at home.

### Organizing the Job

The operations for seeding airports can be summed up under the following headings:

1. The layout of the areas in cooperation and coordination with the grading and topsoiling.
2. Spreading the fertilizer and lime, if and as specified.
3. Producing the desired tilth, or tillage, usually through disking or deep spring-tooth harrowing.
4. Distributing the seed with broadcast or farm drill seeders.

5. Covering the seed by rolling with a corrugated roller, shallow dragging, or brush-float methods.

The organization of the work falls under three main divisions: personnel, equipment, and work progress. With a 500 to 600-acre seeding project, it is essential to have a superintendent in general charge of the work, records, and running inventory; and an engineer in charge of surveys, calibration of equipment, hook-up and hitches of equipment, designation of equipment to be used, and the degrees of cultivation to be given to the soil. One of these men should be familiar with tractor maintenance. At least two truck drivers are required on projects of this kind, with a laborer who can also drive a truck. Two or three other laborers are required for full or

part time. It is well to select the tractor operators from farm laborers experienced in seeding, harrowing and spreading of fertilizers.

Various steps have been found useful in planning the work-area progress. First, a comprehensive map of the entire area, preferably on a 1-inch-equals-300-foot scale, has proved to be very valuable. These maps show the areas to be seeded, the "work areas" or the areas which have been disturbed, and those designated to be seeded outside the work areas. All of these should definitely be shown on the map as soon as they can be ascertained. The map is then carefully gone over with the grading contractor and inspector, and the seeding work coordinated with the grading and topsoiling operations. This is extremely important, if the work is to go forward with the least possible amount of delay and friction. It is well to divide the work into units of approximately 20 acres, as this is the normal day's work for seeding operations. The 100-foot stationing along individual runways, taxiways or

The author has been a member of the Roadside Development Committee of the Highway Research Board since that committee was established. As Chairman of the Roadside Erosion Control Project, he has given careful study to seeding and sodding problems connected with slope erosion control in various states throughout the country. As Professor of Horticulture (Landscape Design) at the University of Wisconsin for more than twenty-five years, he has studied the ecological and agronomic aspects of grasses, as well as their establishment.

This article is based on facts and figures secured during the summer of 1943 when the author was engaged first as Seeding and Sodding Engineer and Inspector for Consoer, Townsend & Quinlan, Chicago, Ill., and later in the capacity of Engineer for Ralph Synnstedt, Landscape Associates, Glenview, Ill., on large military airport projects.

apron can be used to advantage in calculating the size of the various seeding areas.

On the map should be recorded the  
(Continued on page 34)

**3065 LIN. FT. FINISHED in an 8 hr. day**

COMPARED WITH SMOOTHEST HAND-FINISHED JOB IN OREGON—THE PLANEOMETER TELLS THE STORY

OREGON STATE HIGHWAY DEPARTMENT  
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Johnson Mechanical Float Finisher  
100 Ft.  
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Hand Finish Method

**FACTS EVERY CONTRACTOR SHOULD KNOW**

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Can be dismantled into legal truckload complying with highway regulations.

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CONTRACTORS! You can increase the daily production of your paving crew... reduce finishing costs by 50%... and eliminate the bottleneck of hand float finishing with a Johnson Float Finisher. It reduces the finishing crew to two men for a complete job including edging and jointing on any paving project using a seven-sack paver.

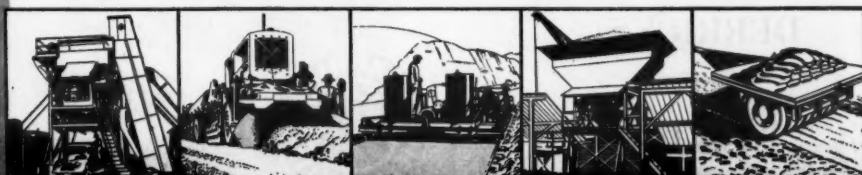
When Roy Houck, Oregon paving contractor, placed 746 cu. yds. of concrete and finished 3065 lin. ft. of pavement in an 8-hour day (383 ft. per hr.), he set a record of production and the Johnson Finisher helped make it possible.

He did not set a record for finishing—the speed of the Johnson Float Finisher is far greater than required under present-day cement concrete production methods.

With the savings in labor and the increased production of the paving crew, the Johnson Float Finisher will pay for itself in 25 miles or less of double-strip highway.

Plan for tomorrow, today! Write for Catalog No. MP-140.

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## Unusual Financing For County Program

(Continued from page 1)

Each Commissioner has in his district a heated storage building in which equipment repair is carried on during the winter months so that it will be available for construction operations when the weather permits in the spring. On an annual pre-war income of approximately \$70,000, derived from the county's share of the state gas tax and license fees, Burleigh County has acquired and completely paid for four Caterpillar and one Austin-Western motor graders, one D8 and four D7 Caterpillar tractors, one Caterpillar pull grader, one 12-cubic-yard LeTourneau scraper and two 5-cubic-yard LaPlant-Choate scrapers, and four Caterpillar elevating graders, two of which are gasoline-powered and two diesel-powered, and in addition has carried on construction and maintenance with a crew of from two to three men in each of the five districts. This force is cut to one man per district in the winter and this man spends his time on equipment repairs when he is not engaged in clearing the county roads of snow. Every operator hired is a qualified mechanic so that by working together, if necessary, they can repair the entire fleet of county-owned equipment during the winter. All county-owned equipment is insured against loss by fire or accidental demolition.

A rather unusual feature of the equipment roster in Burleigh County is that no trucks are owned. It is a theory of the Commission that transportation should be provided by motor graders which can be used for improving and maintaining the roads at the same time. As long as trucks can be rented for work requiring their use, this policy will continue.

### Road and Bridge Program

To date, the construction program has consisted only of bridges, culverts of concrete and corrugated-metal pipe, and graded earth roads, but graveling of all roads from locally available gravel pits will be carried out as rapidly as time and finances permit. While each Commissioner is responsible for the routine work in his district, the Commission as a whole decides the advisability of heavy construction projects, and pools equipment and personnel to do these jobs as required. Each Commissioner is likewise responsible for the maintenance of the equipment assigned to his district, while the Chairman handles all matters pertaining to gasoline rationing and issues gasoline to the districts as their needs indicate.

There are 60 bridges in the county and township road system, about half of which are of concrete and steel construction, while the remainder are of timber. Considerable damage was done to the bridges and drainage structures during

the disastrous floods in the spring of 1943 and when this damage is entirely repaired it is planned to repaint all bridges and begin a comprehensive program of road sign erection.

The extension, improvement, and proper marking of the county road system is an important feature of another plan developed by the present commission, whose successful performance has enabled the county to operate on a cash basis, and have money available for needed road repairs and replacements. The purchase of \$40,000 of war bonds has also been made with certain county funds on hand, the investment of which is permitted by law.

### Tax-Delinquent Lands

Through the farm depression years of the 1920's and the drought years of the 1930's, Burleigh County, like many other North Dakota counties, had a high rate of tax delinquencies. The policy instituted by the present county board has been to acquire title to all lands delinquent for a third successive year and put

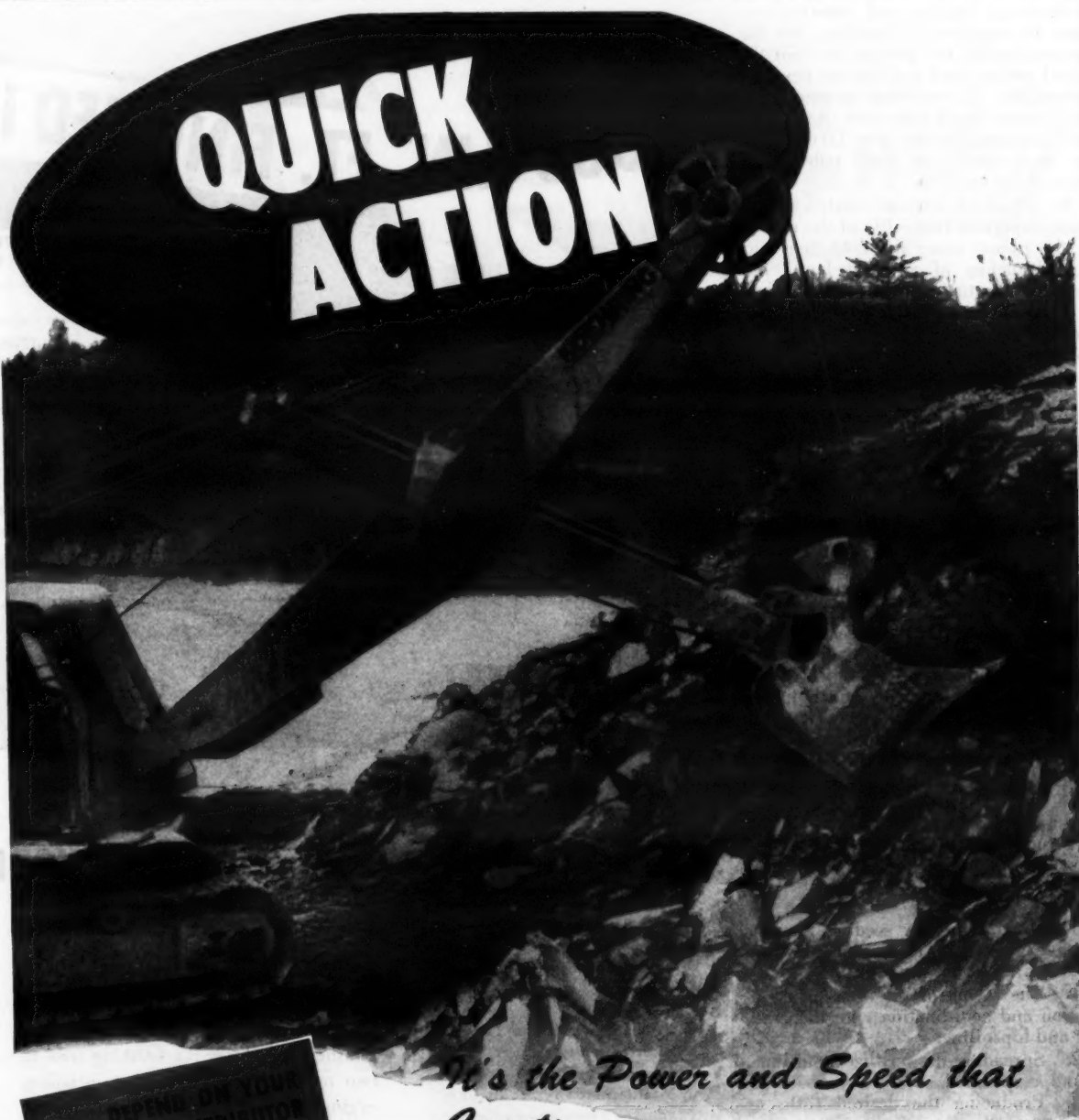
them on a productive basis. Approximately 98,000 acres of land is rented annually by the county to producing farmers for a rental of one-quarter of the crop produced, and a large acreage is rented for hay and pasture purposes for cash. Proceeds from this rental are applied against past delinquencies.

By reason of tax delinquencies the county has acquired title to approximately 25,000 acres per year and it was realized that this acquisition of land by the county must be offset if the county is to prosper.

On October first of each year the County Commission makes an appraisal of all lands to which the county holds title and publishes a list of the lands with their appraised value. On the third Tuesday of November this land is offered for sale on competitive bids but no parcel can be sold for less than the appraised value, although it is often sold for more. Appraisals are purposely kept low, land which a few years ago was considered suitable security for bank loans of \$4 to \$5 per acre being ap-

praised and sold under present conditions for \$1.50 to \$3.00 per acre. Land not disposed of at this sale may be purchased throughout the balance of the year from the County Auditor for not less than the appraised valuation for a payment of one-quarter cash, with nine years in which to liquidate the balance which bears an interest rate of 4 per cent.

The plan has proved successful, with annual sales averaging substantially more than annual acquisitions. Some of this land is being purchased in tracts of from 400 to 600 acres by farmers from other sections of the state who feel that the well-conducted road program makes Burleigh County a desirable place in which to conduct their operations. The financial benefit to the county likewise enabled it to refinance its \$348,000 bonded debt at the substantially lower interest rate of 2 1/4 per cent, and the road program, with its resultant influx of substantial farmers, is generally given credit for the county's improved position.



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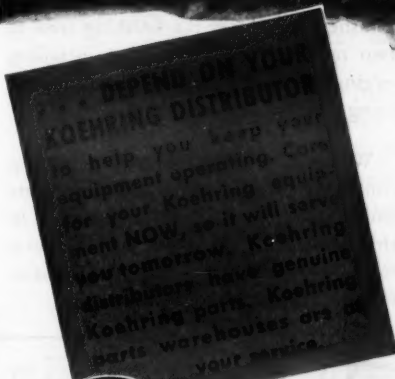
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HEAVY-DUTY CONSTRUCTION EQUIPMENT



### Austin Men Honored With Navy Citations

Sixty key employees of The Austin Co., engineers and builders, were recently awarded individual citations from the Bureau of Yards and Docks, U. S. Navy, for meritorious civilian service in recognition of their work in completing more than \$75,000,000 of Navy facilities in the Pacific Northwest. Over a year

ago, more than four thousand Austin employees received the first Army-Navy "E" Award presented for construction in that area.

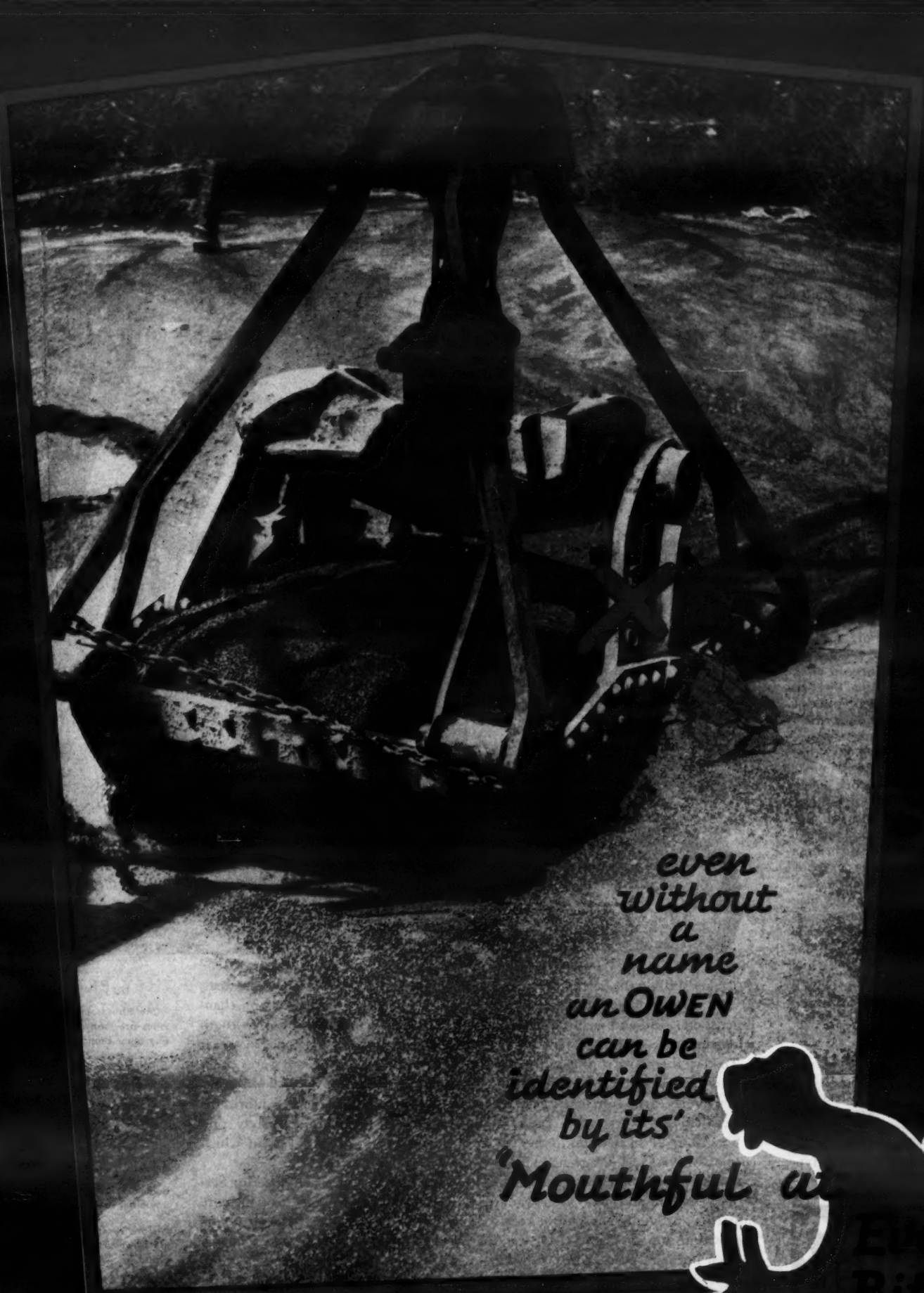
### Metzger Named Head Of New Goodyear Div.

Announcement has been received from the Goodyear Tire & Rubber Co., Akron, Ohio, of the appointment of

Clair L. Metzger to head the recently organized Tractor Tire Division. Since joining Goodyear in 1928 as special goods salesman in Cincinnati, Mr. Metzger has acted as store manager in Louisville, Ky., Charlotte, N. C., Birmingham, Ala., and Baltimore, Md. He became Goodyear District Manager in Peoria in 1937, District Manager in Cincinnati in 1939, and Manager of tractor tire sales in 1943.

### Eastern District Office Of Duff-Norton Co. Moves

Announcement has been made by the Duff-Norton Mfg. Co., Pittsburgh, Pa., manufacturer of jacks for industrial use, of the removal of its Eastern District Office from the Empire State Building to 250 Park Ave., New York City. George L. Mayer is the District Manager in charge.



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# Construct Highways By Contract; It Pays

## Logic and Study of Costs Show That the Award of Contracts on Competitive Bids Is Most Economical

† HIGHWAY construction is financed principally with public funds, but the actual work, if done by contract, involves free enterprise in the manufacture of equipment, the production of materials, transportation, and the actual construction.

That economy and quality lie in the use of the most modern equipment and best materials in highway construction is unquestioned. The producers of these commodities are an important part of the durable-goods industry and the free-enterprise system. This system is shown at its best in competitive contract highway construction which, though generally accepted, was discarded during the depression years when a vast amount of work was done by day labor. This eliminated competition, increased costs, and reduced efficiency. The public interest is better served by the contract system which recognizes the rights of free enterprise, and which gives the maximum return to the taxpayers in the form of fixed costs, economy, satisfactory workmanship, and protection of public funds.

### Proof of the Pudding

The Project Committee on Post-War Planning, in its report to the Highway Research Board in November, 1943, cited the relative economy of highway construction by contract and by day labor as follows: "In carrying out the program of public works highway construction authorized by the Act of June 16, 1933, it was required that each state undertake to construct one or more sections of highway with forces employed directly by the state. The purpose of the requirement was to determine the relative economy and efficiency of highway construction by contract and by direct employment of labor. . . . Forty-six states and one territory constructed fifty-three sections of highway that were considered representative of the work generally done. . . . The sections of highway were selected from advertised work after bids had been received and publicly opened and without advance determination. . . . Construction was executed under the same requirements as for contract work, adhering closely to the original plans. . . . As the work progressed, the state highway department kept detailed cost records of expenditures, classified according to the items upon which bids were received, and of general charges to be prorated among the various items. These data were submitted to the Bureau of Public Roads and are the basis of the report.

"The fifty-three projects selected for the test totaled 244 miles in length and were of various types of construction. Substantially all projects were graded and drained and were surfaced with concrete pavement, a granular type such as gravel or stone, or with a standard type

of bituminous construction. The total cost of construction by the force-account method was \$3,942,879, an increase of \$593,126 or 18 per cent over the total of bid prices of \$3,349,753.

"On forty of the jobs aggregating 176 miles, or 75.5 per cent of the total projects, the cost exceeded the bid price. The actual cost of these jobs by the force-account method was \$2,944,773, an increase of \$703,384 or 31 per cent over the total of bid prices of \$2,241,389.

"Thirteen jobs, totaling 68 miles in length or 24.5 per cent of the total, were completed at a cost less than the bid price. The cost by force account was \$998,107, a decrease of \$110,257 or 10 per cent under the bid price of \$1,108,364."

In the costs under the day-labor meth-

od, all of the costs that the contractor would be forced to carry, such as taxes, are not included.

### Advantages of Competitive Bidding

The same forces which have resulted in this country's successful program of war production apply to the contract construction of highways. Public funds are used for both, yet war production has been handled by free enterprise under competitive contracts. Highway construction should be carried on by the same kind of management if the maximum volume of work and highest efficiency are to result.

Federal-Aid construction has been carried on by contract for many years. Nearly all state highway construction is done by contract, as well as street construction in the larger municipalities. The method has proved to be economical and has saved many millions of dollars.

### Safeguarding Public Funds

During the 1930's \$4,200,000,000 of government funds were spent on high-

way construction without competitive bidding. Applying the savings percentage of 18 per cent by contract construction over day labor, as recorded in the survey of fifty-three projects by the Public Roads Administration, the work which cost the taxpayers \$4,200,000,000 by day-labor construction could have been done by contract at a saving of \$756,000,000, or a total expenditure of \$3,444,000,000. The wasted funds would have financed the entire federal and state highway construction and maintenance program for one year.

### Conclusion

In the report of the Contractors' Division Subcommittee of the Post-War Highway Committee of the American Road Builders' Association at the 41st Annual Meeting in Chicago, February 1-3, 1944, the following advantages of the contract system for highway construction were included in the summary:

1. The awarding authority knows definitely before the project starts the

(Concluded on page 46)



It takes skill on the part of the operator to drop that bucket over the exact spot... skill and well-conditioned wire rope.

To keep their wire rope flexible, protected against core rot, contractors everywhere are lubricating with Texaco Crater.

Texaco Crater penetrates to the very core of wire rope, sealing each wire in a tough, viscous film that reduces internal friction and wear, keeps out moisture, prevents corrosion, keeps rope strong longer.

Used on open gears, Texaco Crater

cushions load shocks, stops undue wear, quiets the noise. It doesn't ball up, channel or throw off, but clings to tooth surfaces, following through from gear to gear, despite heavy pressures, high temperatures and peripheral speeds.

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★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

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★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

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TUNE IN FRED ALLEN EVERY SUNDAY NIGHT-CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY





Paying tribute to the Navy's Construction Battalions, the film "The Fighting Seabees" includes among its stars a wide variety of construction equipment. In this scene, members of the construction crew use an Allis-Chalmers KD-14 tractor and Buckeye bulldozer as a tank to charge the invading Japs.

## Another Highway Bill Added to House List

On March 29, 1944, Congressman Wene of New Jersey added another Federal-Aid Bill to the pair that are now in the hands of the House Roads Committee in Washington. In contrast to HR 2646, the AASHO bill, the new bill HR 4518 cuts the Federal appropriation to \$2,000,000,000, increases the participation to a 50-50 basis and provides for the expenditure of 60 per cent of the appropriation on the Interregional Highway System and its auxiliary roads. It limits expenditure of the remaining 40 per cent to the Federal-Aid primary and secondary systems in such proportions as the state may elect and the Public Roads Administration may approve. It further makes funds authorized under the act available for obligation for a period of three years following the date upon which they initially become available for obligation, and provides that 10 per cent of each year's authorization shall become immediately available for the purchase of rights-of-way and for engineering costs.

Bill HR 4518 provides that the Commissioner of Public Roads shall include in each of his annual reports an estimate of the cost required for completion in each state of all portions of the Federal-Aid highway systems to a standard of improvement consistent with the needs of highway traffic. It further provides that not to exceed 1½ per cent of the amount apportioned for any year may be used for continuing the activities of the state-wide highway planning surveys and for other similar research projects.

Finally, this newest bill apportions funds to the states on the following basis: 20 per cent according to Section 21, the original Federal-Aid highway bill of 1916; 20 per cent according to the motor-vehicle registrations of the several states; and 60 per cent on the basis of the ratio which the motor-vehicle registrations in the counties traversed by the Interregional Highway System in each state bears to the total motor-vehicle

registrations in the counties traversed by the Interregional Highway System in all the states. In any state, the expenditure of this 60 per cent of the state ap-

portionment which is set up by the Interregional Highway System is to be divided between urban and rural sections of the Interregional System so as to conform, within a maximum variation of 10 per cent, with the relative percentage of urban and rural motor-vehicle registrations in the counties traversed by the Interregional Highway System in that state.

## Dirt-Mover Catalog

A complete line of bulldozers, trail-builders, dirt-moving scrapers, and rippers and allied equipment is presented in the sales manual of the Kay-Brunner Steel Products, Inc., 2721 Elm St., Los Angeles 41, Calif. The manual is indexed for quick reference, and contains illustrations, detailed descriptions, and full specifications, including the size of Caterpillar tractor suited to each piece of equipment.

Contractors and highway engineers can secure copies of this catalog by writing to the manufacturer and mentioning this publication.

## A Huge Mixing Job Done in 12 Months

In one year's time Gardner traveling mixers were used on 57,000,000 square yards of mixing for airports, highways, revetments and parking areas. Broken down into types of surfacing, the report shows 4,000,000 square yards of mechanically stabilized base, 9,000,000 square yards of soil-cement base, and 44,000,000 square yards of bituminous wearing surface.

The Gardner-Byrne Construction Co., Redlands, Calif., handles this machine on a rental or subcontract basis. The first Gardner mixer was built in 1929 and it has now been developed so that it can be used for either bituminous mixing or for cement-treated base; to add oil or water to windrows, controlled to 0.5 per cent; various sizes of aggregate can be handled in windrows up to 6 cubic feet per foot of windrow; the machine will operate at rates from 60 to 100 linear feet per minute; and material can be re-mixed if necessary.

# ...Where UTILITIES use COMPRESSED AIR

There are so many jobs where compressed air is needed by power companies—and into this versatile picture fits Schramm Air Compressors. Schramm units—both portable and stationary—are extensively used by the utility field in general field service—generating stations—steam plants—repair shops.

They're compact, lightweight, and easy to start merely by pushing a button.

And they have these distinctive "under-the-hood" features: (1) completely water-cooled to provide total performance both winter and summer (2) seven main bearing supports (3) mechanical intake valve (4) more cylinders and lighter parts (5) forced feed lubrication.

If you are not already using a Schramm, it will pay you to write today for illustrated bulletin 42-PA.

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WEST CHESTER  
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Wood boring  
Picking ice from streets

### STEAM PLANTS

Running, chipping, riveting and caulking hammer  
Operating drills, reamers and flue cleaners  
Supplying hoists, lifts and jacks  
Removing scale, rust and paint by sand-blasting

### REPAIR SHOPS

Cleaning engines and machines by jets  
Operating jacks, lifts and hoists  
Running pneumatic hammers, drills, etc.  
Operating brazing forges and smith fires  
Supplying oil burners  
Tire inflation

### GENERATING STATIONS

Operation of air circuit breakers

## Why PINOLA Wood Preserver is Preferred

- ... It FILLS all sap pores of lumber with waterproof, resinous matter.
- ... It HARDENS the lumber, preventing deterioration.
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Lumber properly treated with PINOLA is the equivalent of Original Heart Pine. Twenty-six years of test prove it best. Every user of PINOLA is a booster. If your dealer cannot supply you write to us.

**THE PINOLA COMPANY**  
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## Lubrication Is Life To Your Wire Ropes

With operating ropes on construction equipment there is one very important factor which must be considered in prolonging the life and service of wire ropes, and that is lubrication. W. Irving Lex, Assistant Chief Engineer, John A. Roebling's Sons Co., pointed out in a discussion of the safe use of wire rope at the National Safety Congress. All wire rope is lubricated at the time it is made, but this lubricant cannot last the entire life of the rope since weather exposures and the kneading action of the

rope as it passes over sheaves and drums tends to wash away and squeeze out this original lubricant. Replenishing of the lubricant is, therefore, necessary not only to protect the rope and prevent the development of corrosion, but to keep the individual wires and the center so well oiled that friction is kept to a minimum.

## Who Sets Up the Signs On State Roads in Cities?

A recent survey of the methods of handling the placing of state highway signs on poles within the corporate lim-

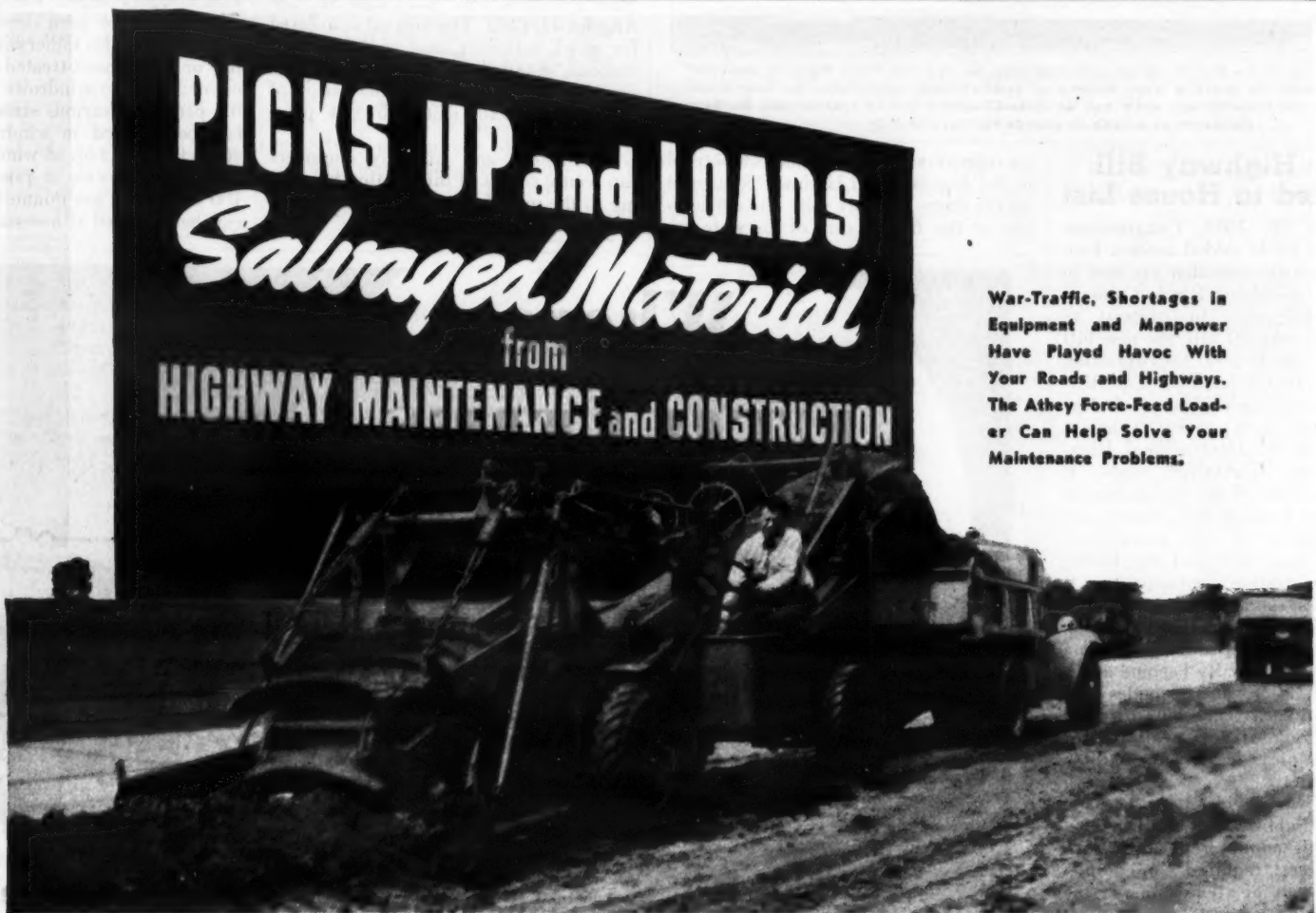
its of cities brought out some interesting diversity of procedure and payment. In some states, the state highway department maintenance forces go right on through the cities just as they do on the rural sections of the highway and place the signs as required. This is the method in Indiana.

Michigan contracts for the placing of the signs, setting up a budget item for this work and awarding the contracts on the basis of cost of the equipment used, materials and labor. In Iowa the work is done by the cities, which are reimbursed at the rate of not more than \$350 per mile for placing the signs and

also for repainting. The payments are made on presentation of itemized costs.

## Calculating Chain-Drive Centers and Chain Lengths

In order to shorten the time required for calculating center distances and chain lengths of chain drives operating over cut-tooth wheels, the Link-Belt Co. has computed and published a series of tables which give accurate results. Copies of this helpful 20-page book No. 1991 may be secured by writing direct to the Link-Belt Co., 307 No. Michigan Ave., Chicago 1, Ill.



War-Traffic, Shortages in Equipment and Manpower Have Played Havoc With Your Roads and Highways. The Athey Force-Feed Loader Can Help Solve Your Maintenance Problems.

**T**ODAY's highway conditions are critical and prompt action is essential if tremendous investments in highways are to be saved before additional damage is done.

During 1944 a vast program of highway maintenance will get underway — roads will be graded, widened, straightened, — ditches will be cleaned and relocated — surfaces repaired — shoulders widened and slopes refaced and graded. The Athey Force-Feed Loader, a proved highway maintenance loading tool, will eliminate the former slow and costly method of loading surplus materials.

### Helps You Do Better Job

Operating as a companion tool to the Motor Grader, it gathers up windrows of surplus material, removes it from the highway and loads it into trucks for disposal or salvage. Earth, sod, rock, sand, oil mix, and many other unruly materials are loaded at higher speed and in greater volume than ever before possible. To load this material by hand labor would be not only expensive, but practically impossible with today's manpower conditions.

The Athey Force-Feed Loader thus saves you time and expense in removing surplus road materials, and also, salvages materials for use where needed on other jobs.

### Ditch Cleaning

Loading and handling excess materials thrown up and windrowed from ditches by the motor grader has long been a problem for engineers and maintenance men. Today, the Athey Force-Feed Loader not only makes this work quick and easy, but it saves so much of the maintenance crew's time that men are released for other road repairs.

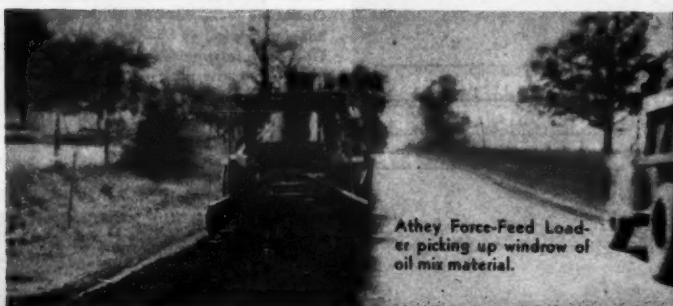
One man operated, the Athey Force-Feed Loader can be moved quickly under its own power from job to job. Its simple and dependable operation affords faster, cleaner, lower cost loading than ever before.

Get complete information on an Athey Self-Propelled, Force-Feed Loader from your Athey-"Caterpillar" Dealer, or write direct to us. Athey Truss Wheel Co., 5631 W. 65th Street, Chicago 38, Illinois.



Reloading material salvaged from highway resurfacing job.

FREE ENTERPRISE • THE OPPORTUNITY AND OBLIGATION TO COMPETE



Athey Force-Feed Loader picking up windrow of oil mix material.

# Athey

## FORCE-FEED LOADERS





## Big Dredging Contract For West Coast Port

(Continued from page 2)

main pump is driven by a 1,600-hp General Electric motor, the 5-foot cutter head by a 500-hp G-E motor, and additional power units include a 100-hp motor for swinging, a 40-hp motor on the blower, two 40-hp and one 250-hp motors on the circulating pumps, with numerous smaller motors. Electrical operations are controlled through a Westinghouse liquid rheostat.

A steel derrick equipped with a contractor-built two-drum hoist is mounted forward for handling pump repairs. The ladder in use at the time of our visit to the dredge permitted digging to 32-foot depths but construction of a replacement ladder which will permit digging to a depth of 50 feet was in progress.

Shop equipment aboard the Los Angeles includes a Barnes drill press with 26-inch capacity, a Beaver  $\frac{1}{4}$  to 2-inch pipe and bolt machine and two Lincoln and one G-E arc welders which are used primarily for refacing the cutter heads, which on this job is done with cast iron rods. In the material being dredged, cutter heads last from four to six weeks and can be changed in one hour, always on a Sunday when operations are suspended.

Additional floating equipment includes a 50 x 20 x 5-foot wooden anchor barge equipped with a wood A-frame and a double-drum hoist powered by a 60-hp Hercules gasoline engine; and a cable barge of the same size and style carrying a reel operated by a Ford V-8 gasoline engine to hold 3,000 feet of submarine cable through which electric power is transmitted to the Los Angeles from the shore lines of the Southern California Edison Co. This cable barge is normally lashed to the dredge with the reel tension so adjusted that the cable will pay off as the barge advances. Motive power is furnished by the power launch Rosa Lee, 40 feet long with a 13-foot beam, powered by a 100-hp Caterpillar diesel engine.

The normal dredge crew consists of a captain, three mates, four levermen, a chief engineer, four assistant engineers, eleven deckhands, three welders and three tugboat men, while a levee superintendent, four levee foremen, twenty levee laborers, and a bulldozer operator make up the shore crew. Three 8-hour shifts are worked, which allows approximately 20 hours of actual daily operation, with an average of 1,200 cubic yards an hour.

### Discharge Lines

The floating portion of the 24-inch discharge line consists of 45-foot joints of welded steel pipe connected with Plummer bell joints. Each pontoon, supporting one 45-foot length of pipe, consists of two hollow welded steel cylinders 56 inches in diameter and 24 feet long joined by two "strong-backs" made of 10 x 12-inch timber and placed parallel to the pipe line. The catwalk is constructed of two pieces of 2 x 12 spanning 8 x 8 timbers bolted across the top of the discharge line by iron hoop-bolts.

Ashore, landing lines are constructed in advance at intervals of 300 to 500 feet and the floating line moved from one to the other as operations indicate. Only enough pipe is included in the landing line to connect the floating line and carry its discharge over the dikes which have been constructed by the Harbor Authority independently of this contract. As the embankment is formed at elevations of 12 to 15 feet above M.L.L.W., additional sections of shore line are added and the embankment extended. Additional 18-foot sections of land pipe with slip joints are moved in and inserted in the female end of the advancing shore pipe line by a cable from a 5-ton Beebe hoist which is mounted on a steel frame

chained to the previously constructed line two or three joints back. A 2 x 1 $\frac{1}{2}$ -inch bar is welded to encircle the female end of the joint from which project  $\frac{1}{4}$  x 1 $\frac{1}{2}$ -inch straps 6 inches long which can be welded to the entering pipe when necessary to keep the joints connected. In locations where all leakage must be eliminated, the entire circumference of the pipe line is welded, but in many locations the welded straps are sufficient and usually even this welding is dispensed with and the steel discharge table or baffleboard held in position by the cable from the Beebe hoist.

A Caterpillar D6, equipped with a LeTourneau bulldozer and a second drum carrying 200 feet of  $\frac{1}{2}$ -inch cable, is used for snaking pipe trucks or single lengths as well as for breaking up shore line preparatory to moving it. With this equipment it has been possible to dismantle the non-welded line at the rate of 500 feet per hour.

Dredged material is moved considerable distances on this contract, as 58 per cent of the material must be moved an

average of 14,000 feet, with a maximum of 18,000, while the remaining 42 per cent requires an average movement of 2,000 to 3,800 feet, with a maximum of 4,500, so the handling of the shore pipe lines is a vital element in the contractor's success. It has been found that the material being dredged invariably takes a discharge slope of very nearly 26 on 1.

It is planned to install an auxiliary pump, identical with that on the dredge, near the midpoint of the long discharge line, when the maximum movement is required. The 24-inch floating line previously used will be replaced by a 27-inch line, 3,000 feet long, connected to 4,000 feet of 27-inch land line leading directly into the suction of the auxiliary pump which will be mounted on an I-beam and timber-grillage foundation.

### Contract Data and Personnel

The contract provides for the movement of 5,200,000 cubic yards of material, 3,000,000 of which has a maximum movement of 18,000 feet and an average of 14,000; 430,000 cubic yards,

a maximum of 4,000 feet with an average of 2,500; 570,000 cubic yards, a maximum of 4,500 feet with an average of 3,800; and 1,200,000 cubic yards, a maximum of 4,000 feet with an average of 2,000.

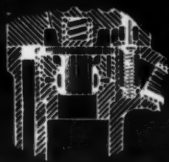
The contract was awarded to the Standard Dredging Co. of New York for the bid price of \$734,200 by the U. S. Engineers on June 16, 1941, but actual dredging did not begin until December 15, 1943, and must be completed by January 31, 1945. W. R. Osgood is General Superintendent for the contractor. The work is being done under the supervision of the Los Angeles District Engineer of the U. S. Engineer Department, for whom H. W. McQuat is Area Engineer, with Captain Bruce W. Bennett, Corps of Engineers, Assistant Area Engineer, in direct charge at the job site.

It has been necessary to suspend operations on this project for approximately eight months beginning about April 15, 1944, in order that the dredge may be released for use on a more urgent U. S. Navy contract.

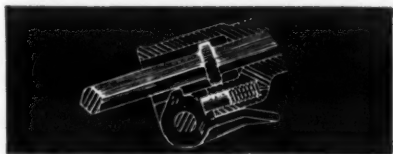
## Thor No. 25 PAVING BREAKER



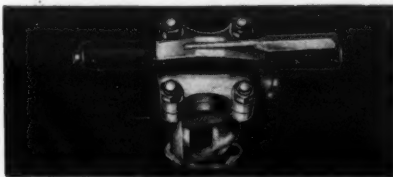
These THOR  
Features Speed  
Heavy  
Demolition Jobs!



• **Positive Short-Travel Tubular Valve**—Gets every ounce of power from every foot of air entering the machine. Actuates a block type piston that minimizes vibration to provide handling ease. Provides low air consumption.



• **Latch Type Retainer**—Simple, fast and easy to operate. Spring detent holds retainer in closed position . . . Pressing with the foot releases the tool. No adjustment is required during insertion of the tool.



• **4-Bolt Back Head**—Special design maintains rigidity between the back head and cylinder, eliminating air leakage and excessive bolt breakage when machine is used for prying. Made of drop forged, heat treated alloy steel. Equipped with rubber grips that keep the handle cool at all times.



**BUILT for Heavy Duty . . .  
DESIGNED for Fast, Easy Handling**

The Thor No. 25 Paving Breaker is the heavy duty "boss" of the Thor demolition crew . . . *built* for the hardest kind of jobs, yet *designed* to provide handling ease that gets those jobs done faster.

Ruggedly built from alloy-steel drop forgings, equipped with a sturdy 4-bolt back head for maximum strength and rigidity, this heavy duty Thor Breaker combines *operating ease* with *power* to make quick work of the toughest demolition jobs in pavement, walls, columns, piers, foundations and the like.

For more information about this powerful, easy operating, heavy duty Thor No. 25 Paving Breaker and full details about light and medium duty Thor Breakers in the complete Thor line of contractors air tools write today for Catalog 42-A.

**Thor**

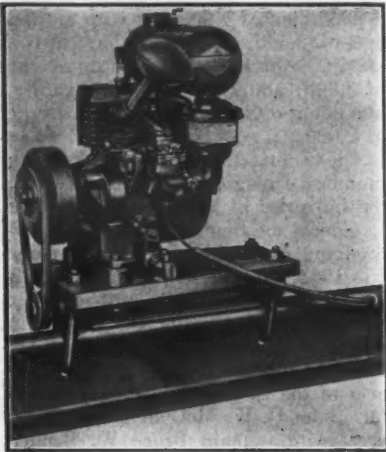
Portable Pneumatic and Electric Tools

**INDEPENDENT PNEUMATIC TOOL COMPANY**

600 W. JACKSON BOULEVARD, CHICAGO 6, ILL.

Branches in Principal Cities





The Master vibrating unit mounted on a section of the screed.

### New Finishing Unit Vibrator, Strike-Off

A new machine for concrete slab and floor jobs, recently announced by the Master Vibrator Co., 100 Davis Ave., Dayton 1, Ohio, combines the operations of strike-off, vibration and finishing in one unit. This Master principle of vibration is designed to make possible full penetration of the vibrations throughout the entire depth and width of the slab, without any additional vibration, regardless of the concrete slump or the amount of reinforcing steel used.

These vibratory finishing screeds are available in six models, 6, 10, 13, 16, 20, and 25 feet in length. All models are powered by sturdy variable-speed Briggs & Stratton Model NP 1½-hp air-cooled gasoline engines, and are equipped with a Master automatic clutch, a special vibrating element, and V-belt drive. The vibrating speed is adjustable from 2,000 to 6,400 rpm. The engine speed is conveniently controlled from the end of the vibrator screed. The screeds are furnished with draw lines for guiding the screed, while holes in the screed permit quick adjustment to various widths.

The manufacturer states that two men with a Master 13-foot VS-13 can compact and strike off concrete slab to accurate grade at the rate of 3,500 square feet per hour, while four men with a Model VS-20 20-foot long machine can do the same operation at 6,000 square feet an hour.

A new 4-page folder describing and illustrating the various features of these Master vibratory finishing screeds may

be secured by interested contractors and engineers direct from the manufacturer by mentioning this descriptive text.

### All-Steel Jaw Crusher For Portable Plant

An all-steel portable or semi-portable jaw crusher, designed for reducing an ordinary feed of rock to average road requirements in one operation, is manufactured by McLanahan & Stone Corp., Hollidaysburg, Penna., as part of its line of quarry equipment. McLanahan jaw crushers are available in 10 and 12 x 16, 10 and 12 x 20, and 10 and 12 x 24-inch sizes, and are furnished as separate units, mounted on skids, or on trucks with a collapsible elevator. They may also be equipped with direct rear power-take-off drives for use with tractors.

The manufacturer states that every effort has been made to simplify the construction of these units. The throat or crushing area is lined with the best material obtainable, and to assure long

life and reduce the number of spares required, the one-piece manganese-steel jaws are interchangeable. The overhead eccentric, with an improved force-feed and gravity discharge, is designed for large capacities of even-sized products, and the bearings and shafts are constructed and located to prevent bending and weaving. Alemite force-feed lubrication is used for all bearings. Adjustment for size can be made quickly and easily while operating by revolving the hand wheel on the adjustment shaft which operates the non-corroding manganese bronze screws by means of dust-protected worm gears. The standard adjustment is 3 inches, but a greater opening can be obtained by using shorter toggles.

Capacities of these McLanahan jaw crushers range from 3 to 6 tons of ¾-inch material an hour for the 10 x 16 size, 4 to 8 tons an hour for the 10 x 20 and 5 to 10 tons for the 10 x 24, up to 14 to 21 tons of 3-inch material an hour for the 10 x 16-inch size, 18 to 26 tons an hour for the 10 x 20, and 22 to 31 tons an hour for the 10 x 24 unit. The

rpm of the crushers vary from 250 to 300.

Further details on McLanahan jaw crushers are found in Catalog JC 35, copies of which may be secured direct from the manufacturer by mentioning this item.

### Victor Welding Catalog

A new 16-page catalog with color photographs has been released for distribution by the Victor Equipment Co., 844-54 Folsom St., San Francisco 7, Calif. The catalog does not attempt to cover the complete line of Victor acetylene welding equipment but gives a general pictorial impression of the company's products and how they can best be used. Technical descriptions of the units pictured are included, and the company will welcome inquiries for more complete information on these and other types of apparatus.

Copies of Victor Welding and Cutting Apparatus Unit Bulletin, Form 20, may be secured by writing to the manufacturer and mentioning this item.



Your present excavating equipment will probably have to last for the duration. Under pressure for more and more output in its vital service on the production front, it is operating at top capacity, — very likely three shifts per day.

Good lubrication care, more than anything else, is the most effective maintenance insurance you can obtain. Proper lubrication will extend the life of your excavator, it will avoid breakdowns, will reduce cost of operation and increase output by reducing delays.

To keep your equipment in fighting condition, do these things:

Lubricate each part regularly and thoroughly as prescribed by your manufacturer's operating instructions.

Use the right amount of lubricant. Too much can sometimes be harmful.

Use the right lubricant as specified for each fitting and part. A good lubricant when applied in the wrong place may be more harmful than none at all.

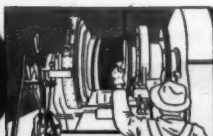
Use only good quality lubricants. "Cheap" oils and greases are dangerous to the machine.

### KEEP LUBRICANTS CLEAN

A good operator takes pride in his machine. He keeps it clean and trim and properly lubricated always. It pays off in smooth, continuous performance, maximum production, and long operating life.

**BUCYRUS  
ERIE**

HERE ARE A  
FEW SPECIAL  
POINTS  
TO WATCH



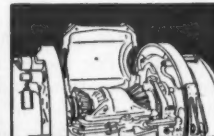
1. Ropes and drums should be lubricated regularly. Apply a thin layer often to avoid splatter in operation.



2. Be sure to lubricate the suspension ropes. They are likely to rust their strength away if you don't.



3. Lubricate cats even if machine is not propelled much, as normal digging reactions cause some wear.



4. Keep the proper amount as well as the correct grade of oil in your gear enclosures at all times.

**\*\*For HOSE  
BOOTS, CLOTHING or  
PUMP DIAPHRAGMS**

*Call YOUR  
Continental  
BRANCH*

**Immediate Delivery  
from Local Stock**

#### BRANCHES

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Detroit	San Francisco
Indianapolis	St. Louis

**CONTINENTAL  
RUBBER WORKS**

ERIE, PENNSYLVANIA, U.S.A.



**Bucyrus-Erie**

SOUTH MILWAUKEE, WISCONSIN, U. S. A.



## Fourth Short Course At Ohio State Univ.

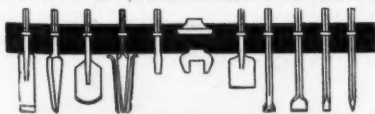
Roadside Development Discussions  
At Short Course Bring Out Largest  
Attendance: "Complete Highway"  
The Theme for Variety of Topics

THE Annual Short Course on Roadside Development at Ohio State University, arranged through the cooperation of the Ohio Department of Highways and the University's Department of Landscape Architecture, was held for the fourth year on March 10-11, 1944. Unique in its field, the Ohio Short Course has brought together a larger number of men from both within and outside the state at each annual session. This year, despite the war and difficult travel conditions, the program included nine out-of-state speakers who, with the ten speakers from various state departments, presented many phases of discussion on the central theme of all sessions "The Complete Highway".

The morning session on Friday, March 10, had as its topic "The Complete Highway as It Concerns the Public". After stimulating greetings from Dean Charles E. MacQuigg, College of Engineering, a series of papers was presented to give the reaction of the public to the service of the highway in commerce and daily life. Ralph W. Peters, Editor, *Defiance Crescent-News*, Defiance, Ohio, discussed the present status of the Anthony Wayne Memorial Parkway, pointing out its importance in maintaining before the public the historic features of the Indian wars which followed the Revolution, as well as providing a traffic facility through some of the most attractive sections of northern and western Ohio.

A paper by Erwin C. Zepp, Curator of State Memorials, The Ohio State Archeological and Historical Society, was presented by the supervisor of the New Philadelphia, Ohio, Division, and stated that in order to continue the teaching of history throughout the lives of citizens, highways should, in so far as economical, pass historical memorials and lead to them. The Ohio State Archeological and Historical Society has acquired land for new entrances for several of its parks to be reached from main highways and has received the fullest cooperation from the Ohio Department of Highways in the construction and maintenance of these new entrances. In 1942, there were 1,863,437 registered motor vehicles in Ohio, and studies have shown that 60 per cent of all travel by motor vehicles was for pleasure. It was pointed out that historical shrines provide places for people to go, as is evidenced by the fact that in 1942 there were 1,250,000 visitors to historical memorials in Ohio. Plans are now being made to solve the traffic problem in reaching the new William McKinley Memorial in the heart of Canton, Ohio. The last legislature approved the acquisition of the memorial by the state, and now the State Archeological and Historical Society, the Department of Highways, the state highway patrol, and other state departments, are working on the problem

### "BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

**BICKNELL MANUFACTURING CO.**

12 LIME STREET ROCKLAND, MAINE



Head table at the Dinner Meeting of the Fourth Annual Short Course on Roadside Development, Ohio State University, March 10-11, 1944. Reading around the table, Wilbur H. Simonson, Senior Landscape Architect, Public Roads Administration; Charles R. Sutton, Head, Landscape Department, Ohio State University; W. V. Buck, Senior Landscape Engineer, FRA, Columbus; Dallas D. Dupre, Jr., Chief Landscape Architect, Ohio Department of Highways; John L. Wright, Director, Roadside Development, Connecticut State Highway Department; Roy W. Crum, Director, Highway Research Board; Theodore Reed Kendall, Editor, *CONTRACTORS AND ENGINEERS MONTHLY*; and H. J. Neale, Landscape Engineer, Virginia Department of Highways.

of providing easy access for visitors to the memorial without causing traffic congestion in the vicinity. It was also pointed out that where the Department

of Highways has established small roadside parks, of which there are over 200 in Ohio, there has been a drop in attendance at nearby historic park areas.



**2A** 4-wheel hydraulically operated Scrapers for earth moving, specifically constructed for fast digging, easy loading, accurate spreading.



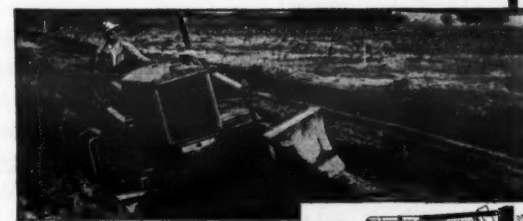
**2B** 4-wheel cable operated Scrapers for earth moving provide less power to load; greater clearance; flexibility for fast hauls; positive rolling ejection; precision spreading.



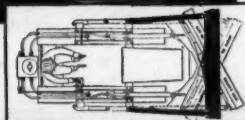
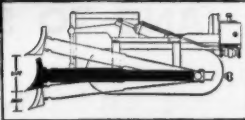
**2C** 2-wheel hydraulic Scrapers for low-cost, earth moving—dig, load, haul, back dump, make short turns.



**2D** Bulldozer: Blade fixed for pushing loads ahead.



**2E** Roadbuilders: Blade set to push loads ahead, side-cast loads to left or right.



## GAR WOOD Road Machinery

Gar Wood Industries, Inc., manufactures a complete line of heavy-duty, earth-moving machinery: two-wheel Hydraulic Scrapers in 3, 5, 6, and 8 cubic-yard capacities; four-wheel Hydraulic Scrapers in 8, 10, and 15 cubic-yard capacities; four-wheel Cable Scrapers in 11, 15, 20, and 25 cubic-yard capacities; Bulldozers; Roadbuilders; Tamping Rollers; Rippers. Accepted by leading contractors and governmental agencies throughout the world, as meeting all requirements for heavy earth-moving equipment.

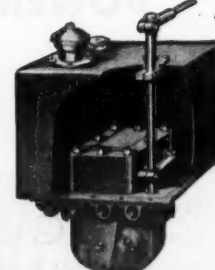
Refer to picture number when ordering literature



**2F** Rippers rip compacted earth, shale, rock, roots, old pavements, old roads.



**2G** Sheep-foot Tamping Rollers built with interchangeable drums (single, double, triple).



**2H** Hydraulic Control Unit



**2J** Cable Control Single Drum



**2K** Cable Control Double Drum

Hydraulic and Cable Control Units for operation of Scrapers, Bulldozers, Roadbuilders, Rippers, for heavy-duty service with track-type tractors.



GW ROAD MACHINERY  
is Sold Through  
**ALLIS-CHALMERS**  
Dealers Everywhere

ROAD MACHINERY DIVISION

**GAR WOOD INDUSTRIES, Inc.**  
DETROIT 11, MICHIGAN





# Flight-Strip Runway Of Hot-Mix in South

## Isolated Location Required 99-Mile Haul, with Trucks Making a Round Trip Daily; Heavy Base of Local Rock

✦ A FLIGHT STRIP of somewhat unusual character has recently been completed and placed in service in the South. An 8-inch base was built of local rock hauled in and compacted on an undisturbed layer of the same rock, which has a known depth of 290 feet, determined by drillers seeking water in the vicinity. The second unusual feature is that there are no drainage structures whatsoever, and third, the hot-mix surface for the 4,000 x 150-foot runway was hauled 99 miles from the nearest plant.

The right-of-way taken for the Flight Strip is 8,000 x 1,000 feet, while the runway is paved 4,000 feet in length and 150 feet wide. At either end, the 2,000 feet beyond the runway up to the wind cones was primed to prevent erosion and to check dust. It provides a very acceptable surface for runway purposes in keeping with the emergency character of the Flight Strip. The cost of this state-built Flight Strip, \$688,000, was somewhat in excess of the others previously built, where the cost has been somewhat under \$500,000, because of the solid rock encountered, the high labor prices prevailing in this section when bids were received, and the long haul for the surfacing material. The hauling of the hot-mix such a long distance was not contemplated, as it was originally planned to barge materials to the site and do the mixing in a small hot-mix plant, but this equipment was not available when paving started. As the local rock is not considered of satisfactory quality for an asphaltic wearing course, and no suitable rock for this purpose was available in the vicinity, no material reduction in cost could have been achieved by a change to a road-mix surfacing.

### Grading and Base

The clearing and grubbing of the 212.88 acres was done by D8 tractors, which bulldozed the trees out even though the roots were imbedded in the heavy lime rock. Grading consisted of removing high spots not over 3 feet above the final elevation and making fills of about the same depth. The high rock was shot after drilling with six Cleveland and Gardner-Denver wagon drills powered by four Worthington portable air compressors.

The graded area contained numerous pockets of organic muck which had to be removed, wasted, and replaced with rock-fill material. The area also contained numerous domes up to 5 feet in height of hard cap rock which either had to be blasted off or the grade elevated over them. The contractor requested and was granted permission to eliminate from the work the removal of a substantial amount of cap rock and to use instead additional fill material at his own expense. As there is practically no quantity of usable earth overlying the rock in this section of the country, rock for fill material was the most economical.

The base rock, a soft limestone, was excavated from a pit in salt water by four draglines, a Northwest 4-yard, two Marion 3 1/2-yard, and a Bucyrus-Erie 5-yard, all with Page buckets. The hauling trucks dumped the rock on the site, and it was spread by two to six bulldozers. Those used for the larger portion of the work included a D8 with a La-Plant-Choate bulldozer, a TD-8 and a TD-14, each with Bucyrus-Erie bulldozers. The lumps in the soft rock were crushed by running the crawler tractors over them. Following this, five Caterpil-

lar and Galion power graders worked the material over while five 10-ton and one 12-ton 3-wheel power rollers compacted the 8-inch base course. The over-size material was bladed to the shoulders, broken up or hauled to the borrow pit.

The area to be paved with hot-mix was primed with 0.12 gallon per square yard of RC-1, and the shoulders for a distance of 150 feet outside the runway and the 2,000 feet beyond the ends were stabilized by an application of 0.30 to 0.35 gallon of TC-2 tar per square yard.

### Paving and Priming

The hot-mix was hauled a distance of 99 miles over the highway, arriving in a rather cool condition but still workable. It was spread on the runway in 10-foot lanes by a Barber-Greene ma-

chine running at 12 feet per minute. The hauling fleet consisted of an average of forty-six trucks, which made one round trip each per day, delivering an average of 250 tons per day and a maximum of 442 tons within a single working day, which ran as late, or early, as 3:30 a.m. The spreading of the 1-inch binder course of aggregate passing a 3/4-inch screen, followed by a 1-inch top course of aggregate passing a 1/4-inch mesh, required one month and one day to complete under these conditions. A pair of 5-ton Buffalo-Springfield tandem rollers handled all the hot-mix rolling.

The surface of the runway was sealed with an application of 0.12 gallon of RC-1 covered by 0.3 cubic foot of 1/2-inch chips per square yard. This differentiated the runway area very well from the shoulders and extensions, which were only primed.

### Quantities and Personnel

The major quantities were:

Clearing and grubbing	212.88 acres
Excavation, grading	36,857 cu. yds.
Excavation, borrow	363,393 cu. yds.

Excavation, borrow, special	57,000	cu. yds.
Excavation, overburden at pits	24,675	cu. yds.
Excavation, subsoil (mu.k)	8,573	cu. yds.
Excavation, subsoil, unclassified (below finish grade)	21,998	cu. yds.
Overhaul, 1/2-mi.-stations (1/2 mile free)	122,104	1/2-mi.-sta. gals.
Tar prime	89,719	gals.
RC-1 prime under hot-mix	8,456	gals.
Asphaltic concrete, binder and surface	70,411	sq. yds.
Base course, shoulders and extensions (scarifying, bonding, and finishing)	448,595	sq. yds.
Mineral seal cover, passing No. 4 sieve	410	cu. yds.
Bituminous material seal, RC-1	12,431	gals.

The contract for the grading and paving of this southern Flight Strip was awarded to Belcher Oil Co. by the state highway department on the bid of \$613,501.77, with \$57,000 added later for extra work. The contract called for 150 working days, but the conditions under which the work was performed required 237 days for final completion. Officials feel that the contractor is to be congratulated on the completion of the project in a minimum time, considering the long haul of paving material and the increased quantity of fill material. George Butler was the Project Engineer for the state highway department.



## POWER TO WAGE WAR AND TO SERVE PEACE

FROM the very beginning, GM Diesels have been tested in the crucible of war. They power tanks, heavy gun tractors and bulldozers; submarines and subchasers; invasion boats and lighters. And everywhere, always, these weapons are proving worthy of the fine fighting men who are using them.

That is because GM Diesel operation is based on simple and sound mechanical principles. GM Diesel construction is exceptionally strong and uniformly precise—the way General Motors always builds.

When normal life and living are resumed, GM Diesels will be as ready to step back into private life and resume service in peace as they were to go to war. And you will find them as capable of sure, reliable, low-cost performance on the toughest jobs at home as they are on fighting fronts the world over.



ENGINES... 15 to 250 H.P. ... DETROIT DIESEL ENGINE DIVISION, Detroit, Mich.

ENGINES... 130 to 2000 H.P. ... CLEVELAND DIESEL ENGINE DIVISION, Cleveland, Ohio

LOCOMOTIVES... ELECTRO-MOTIVE DIVISION, La Grange, Ill.



America's farmers are going to need GM Diesel power for their tractors. This sure, reliable, low-cost source of power will go far toward solving some of the farmer's most vexing problems. And not the least of these problems is to get more work done, faster and at lower cost in labor and mechanical power. GM Diesels will help.

for  
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# IT WILL PAY YOU TO COMPARE TOURNAPULLS

WITH ORDINARY TRACTORS  
ON THESE 4 POINTS

SPEED

YARDAGE

WEIGHT

POWER



To More Profitable  
Earthmoving

Postwar construction plans for rebuilding, relocating and widening highways and for lengthening airports definitely show the trend is to longer hauls. To profitably handle these longer-haul jobs of tomorrow, you'll need equipment that can move big yardages fast. Tournapulls are the answer. Compare them with ordinary tractors and tractor-drawn scrapers for:

**SPEED**

Tractor speeds range from 1.5 to 7 m.p.h. Tournapulls operate from 2.6 to 14.3 m.p.h. and average 2 to 3 times faster than the fastest tractors. Chart below shows what this greater speed can mean to you in extra yardage.

**YARDAGE**

ONE-WAY HAUL DISTANCE—CU. YDS. PER HOUR\*

Tractor-drawn Scrapers:	400'	600'	800'	1,000'	2,000'	3,000'	4,000'	5,000'	6,000'
30-Yd. Capacity	—	—	175	153	97	71	56	46	39
23-Yd. Capacity	—	187	162	142	89	65	51	—	—
18-Yd. Capacity	196	163	139	122	74	—	—	—	—
15-Yd. Capacity	170	142	121	106	65	—	—	—	—
With 15-Yd. Super C Tournapull you get:	200	180	168	156	116	91	76	65	55

\*All units pusher loaded on level.

Example: On a 2,000-foot, one-way haul, the Super C Tournapull will move, on an average, 27 cu. yds. more per hour than a 23-yard scraper.

On 10,000-hour working life, that's 270,000 cu. yds. Figure the gain to you at your own usual bid price!

Prime Mover and Equipment	Super C Tournapull & 15-Yd. Carryall	Tractor & 15-Yd. Scraper Approx.	Tractor & 18-Yd. Scraper Approx.	Tractor & 23-Yd. Scraper Approx.	Tractor & 30-Yd. Scraper Approx.
Weight of Combined Units	31,000 #	53,500 #	57,575 #	65,575 #	70,875 #

On a 30-yard scraper, this much dead weight back and difference in weight is the forth over a 10,000-hour working life? Can you afford to lug that

**POWER**

What's more, the Tournapull has more power for its working weight—150 d. b. h. p. for 31,000 lbs.—which gives you higher average speeds and quicker getaway.

Why use slow-moving, overweight equipment, when you can have faster-moving, job-proved Tournapulls? You'll pay less, move more yardage . . . more profitably. Figure NOW to use Tournapulls on your postwar jobs.

Like all big-capacity earthmovers, Tournapulls are built for quick loading with pusher aid. Their extra speed makes long hauls profitable.



## LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA



Manufacturers of TOURNAPULLS\*, DOZERS, CARRYALL\*  
SCRAPERS, POWER CONTROL UNITS, ROOTERS\*,  
SHEEP'S FOOT ROLLERS, TOURNAROPS\*, TOURNA-  
TRAILERS\*, TOURNAWELDS\*, TOURNACRANES\*.

\*Trade Mark Reg. U. S. Pat. off.

**RUBBER-TIRED POWER FOR FASTER EARTHMOVING**

## Batching and Paving For New Access Roads

(Continued from page 1)

served well to pack the earth under the base of the forms. The grade was checked with a scratch template by the eight men in the fine-grade crew and was rolled by the dual pneumatic tires on a water truck.

A novel method was used to sprinkle the grade to keep down the dust and prevent too great an absorption of water from the concrete. A 1,200-gallon water tank was mounted on a flat-bed truck with a small Gorman-Rupp portable pump chained on top of the tank to supply pressure for the water which was distributed by a man sitting on top of the tank and manipulating the hose.

Two men were used to set the expansion joints at intervals of 40 feet to match the joints in the old pavements. The joints were 1 inch thick and were without benefit of dowels; in fact, there is no steel in this pavement. Ten iron pins were used to hold the two pieces of expansion joints, and each pair, on opposite sides, was driven diagonally to form an X for greater support of the expansion joint. The dummy joints were cut at 20-foot intervals, except where there was a short section of 50-foot spacing of expansion joints in the old pavements, and there the dummy joints were cut 16.3 feet apart.

### The Batching Outfit

The batching plant was set up near the Y so that the maximum haul was about 2.5 miles. An existing spur track was used for the aggregate cars and an adjacent one for cement. The Blaw-Knox batching plant was a 3-bin outfit under which the 2-batch trucks backed for their loads. The aggregates were unloaded from the various types of gondola cars, with high and low sides, by a Koehring 302 crane with a 45-foot boom and a 3/4-yard clamshell bucket. The aggregate was banked above the tracks on a slight rise so that the crane operator could see into the cars and shorten the time that the two men were required for cleaning the cars and aiding in spotting the bucket. A maximum of twelve cars of aggregate were unloaded in a day. The cars were moved and spotted by a Caterpillar D6 which was equipped with a LeTour-

neau bulldozer and was used most of the time in trimming the stockpile.

The contractor ran a maximum of eight batch trucks and a minimum of five. He also used two 2-yard Jaeger truck mixers for hauling concrete for the curb and gutter, sidewalk, the narrow 4-foot strip, patching, and for trench cuts. The same batches were used for both the paver and the truck mixers as follows:

Gravel	2,069 pounds
Sand	1,179 pounds
Cement	6 bags

Water was 24.3 gallons per batch as of the day this job was visited, when the gravel moisture was 4.3 per cent and the sand moisture was 5.0 per cent.

Two cement cars were kept open and one used for the paver and the other for the truck mixers, although they both used the same number of bags of cement per batch. There were four men in the car serving the batch trucks and two in the car for the truck mixers.

### Pouring the Concrete

The 1,200-gallon sprinkling truck came into prominence again, as it was used to supply water for the paver, de-



C. & E. M. Photo

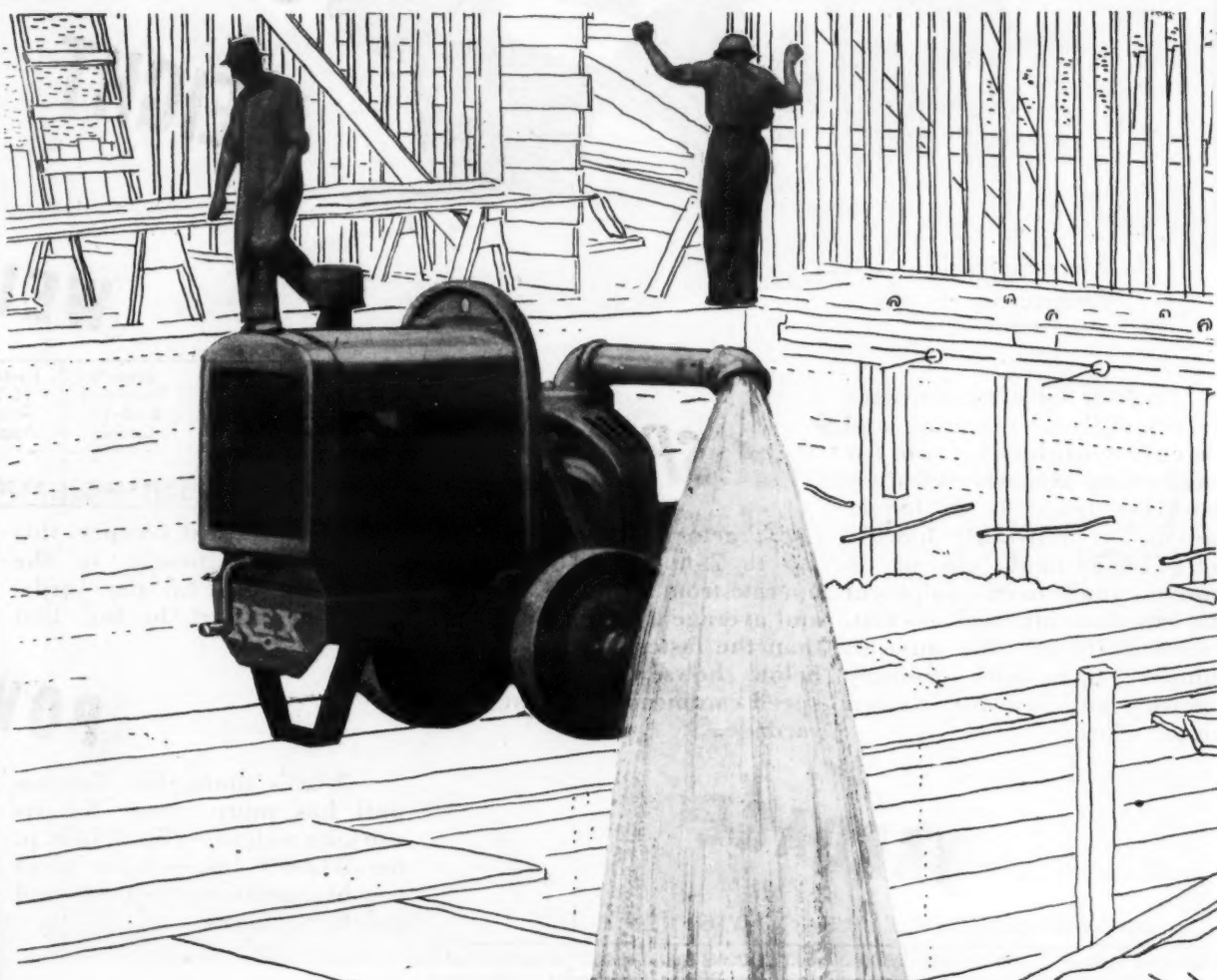
Broken sections of concrete pavement on the old north entrance highway to Mobile were cut out carefully for patching after the new widening pavement was laid so as to keep traffic moving at all stages of construction.

livering it to an 1,800-gallon rectangular tank mounted on skids so that it could be pulled along the shoulder by the Caterpillar No. 12 grader. Water from this tank was pumped to the Koehring 27-E paver by a Jaeger portable pump.

At the paver one man dumped the

batches and cleaned the truck bodies while three men worked as puddlers and two others cleaned the concrete from the adjacent slabs. Because the batch trucks and the paver ran on the firm subgrade, two men were used to repair any dam-

(Concluded on next page)



## You start the motor—it does the rest!

When you use a Rex Speed Prime Pump, all you have to do is start the motor—it practically operates itself. You don't have any worries about priming or re-priming. That's all handled automatically by the Rex recirculating valve and the sensational "Air-Peeler" that literally peels air from the impeller and rushes it out the discharge. This fast automatic prime and great air handling ability allows a Rex Pump to start moving water in the shortest possible time.

Rex Pumps are built for service, too. Their "Free-Flow" design eliminates water "detours"—assures a straight-line flow that increases pump efficiency. It's natural, though, that Rex Pumps should be designed

right. They are made by the manufacturers of Rex Mixers, Moto-Mixers, Pavers and Pumpcrete which have been outstanding performers in the construction field for many years.

For information on Rex Pumps, send for Bulletin No. 433. And check the other Rex construction equipment: Mixers, to cut concrete placing costs; Moto-Mixers that speed the mixing, hauling and placing of concrete . . . Pavers that can give you really heavy yardage production faster—Pumpcretes, the pumps that pump concrete by pipeline. See your Rex Distributor or write to Chain Belt Company, 1666 W. Bruce St., Milwaukee 4, Wis.



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EST. 1900

Union Iron Works, Inc.  
ELIZABETH, New Jersey



## Three Access Roads For Wartime Traffic

(Continued from preceding page)

age to it and to even off any high spots caused by the paver crawlers. The paving on the second contract required spacing of the forms from 20½ feet near the Y down to 4 feet for the widening strips. A Jackson vibrator was used to prevent honeycomb along the forms and at all expansion joints as they were poured.

Finishing was done by a Blaw-Knox double-screed finishing machine followed by two hand finishers with Cleveland straight-edges and one with a 6-inch x 4-foot long-handled float for making up any inequalities in the machine-finished slab. Some trouble was experienced in keeping the long finishing machine on the forms when it was running the 20½-foot width, with flat wheels on the slab and a double-flanged wheel on the form, particularly when there was a slight super-elevation.

The next pair of finishers used a belt made of the only available material approximating the specified canvas belt, a long piece of mattress ticking. The expansion joints were cut and also edged by these two men. Another pair cut the center dummy joint and inserted the steel bars by using a board laid down the center of the pavement and cutting the slot with hatchets. These same men cut the dummy joints in like manner.

The 4-foot mall between the pavements on the extension leading to the Craft Highway was filled with earth, compacted and paved over with a 4-inch slab of concrete slightly crowned and curved to form a curb at the edges.

### Patching

The old concrete pavement had many places where the 7-6-7-inch section was broken or disintegrated and had to be removed and patched with concrete to insure the integrity of the new thoroughfare. The patches were made by cutting out the weakened areas with a Cleveland jackhammer and drill powered by a portable Gardner-Denver air compressor. To insure an even straight cut across the ends of the area, a ladder-like device was made of 2 x 4 lumber with the openings about 2 inches square, through which the drill was run. This resulted in very regular patches which were poured after the other paving had been completed by using truck-mixed concrete and hand finishing.

### Personnel

The contracts for the construction of these three sections of industrial access roads into Mobile were awarded by the Alabama Highway Department to the lowest responsible bidder, Ledbetter & Johnson, of Rome, Ga., for whom A. M. Carter was Superintendent. For the State Highway Department the work was in charge of C. R. Camp, Resident Engineer, and J. A. Thames, Project Engineer.

### V-Belt Drive Handbook

A handbook of technical information on the design of V-belts and V-belt drives

has been made available by the Goodyear Tire & Rubber Co., Akron, Ohio. The 33-page pamphlet, "Goodyear Engineering Data for V-Belts", is a reprint of that part of Goodyear's "Handbook of Belting" dealing with basic V-belt design, engineering and proper recommendations for industrial multiple V-belt drives. One section is devoted exclusively to Goodyear's new steel cable V-belts.

Interested engineers and engineering departments can secure copies of "Goodyear Engineering Data for V-Belts" by writing direct to the company, and mentioning this item.

## Kentucky Legislature Sifts Highway Bills

Several bills which would have reacted most unfavorably on future highway construction in Kentucky were defeated by the legislature which adjourned sine die on March 15, 1944. W. P. Humble, Executive Secretary,

Kentucky Association of Highway Contractors, reports that the two highway measures to pass both the General Assembly and the Senate were: a bill to require the Department of Highways to maintain county and municipal airports, estimated to cost \$40,000 annually; and Senate Bill No. 37 to prevent diversion of highway funds. This latter bill now must be ratified by the voters of the state at the November, 1945, election to go into effect.

The bills which were defeated included proposed appropriation of \$2,500,000 from the road fund to retire bonds on all state-operated toll bridges; one to refund gasoline taxes paid on gasoline used in tractors or stationary engines for agricultural purposes, which would have meant a loss of more than \$1,000,000 annually; one to appropriate \$2,000,000 annually from the road fund to retire county road and bridge indebtedness; one to increase the rural highway fund from \$2,000,000 to \$3,000,000; one to appropriate 20 per cent of the state gasoline tax to cities for the

construction and maintenance of city-state highways, estimated at \$2,500,000; and the last of the group to be defeated would have refunded the gasoline tax on fuel used by aircraft to cities and counties.

## Machine Tool Accessories Described in New Catalog

Highway shop personnel and contractors will be interested in a new 12-page catalog of machine-tool accessories issued by the Machinery Products Div., Ideal Commutator Dresser Co., 1290 Park Ave., Sycamore, Ill. The items described and illustrated include a magnetic chuck with built-in ac rectifier, triple-duty live centers with interchangeable center pieces, a portable demagnetizer, a metal etcher, a self-energized electric tachometer, grinding wheel dressers, variable-speed transmissions, and electric cleaners.

Copies of this booklet may be obtained by writing direct to the manufacturer and mentioning this review.



Stripped of wings, gun turret, engines and machine gun, this R.C.A.F. bomber is on its way to a repair depot. Ahead lies 14 miles of wilderness. The "prime mover" on this job is the rugged International TracTracTor.

# RCAF Salvages the Bomber — with INTERNATIONAL Power

NOW it can be told . . . the story of the toughest aircraft salvage job ever attempted by the Eastern Command of the Royal Canadian Air Force in cooperation with detachments of the Canadian Army.

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The operation took a large crew five weeks to complete, but it was worth it. And when the day came to start pulling the bomber out, an International TracTracTor furnished the towing power over the temporary road.

Getting the bomber off the ice, weakened by the spring thaw, was as much of an engineering problem as the build-

ing of the road. Holes were cut in the ice and 56-foot tree trunks were sunk 23 feet to the lake bottom. The bomber was strapped to the poles and floating wooden platforms built.

Airmen then dismantled the bomber—first the machine gun, then the gun turret, the wings and the engines. Wooden sleds carried this equipment across the ice to the camp site.

Bomber salvage . . . road building . . . dirt-moving. They are all a part of the work of International TracTracTors in wartime, convincing proof that these versatile crawlers have the stamina and built-in performance you want, now and post-war.

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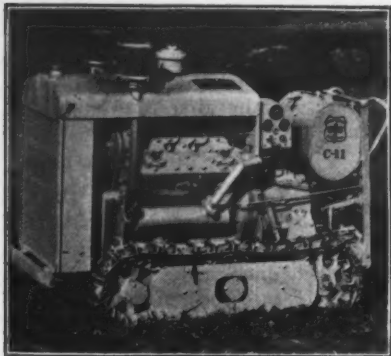
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# INTERNATIONAL POWER





The new crawler-mounted self-propelled Schramm Model 60 air compressor.

### New Self-Propelled Crawler Compressor

A new small hard-hitting self-propelled compressor, mounted on crawlers for use in the roughest type of terrain where it would be impossible to haul the larger trailer-mounted units, has been announced by Schramm, Inc., West Chester, Pa. Developed first for forestry work where every possible condition of weather, altitude and terrain had to be faced, this new outfit is now available for any type of construction job.

The compressor unit is the Schramm Model 60, including a Ford-Mercury gasoline-engine-driven compressor delivering 60 cubic feet of air per minute, an electric starter with battery-charging generator and battery radiator cooling unit with fan and circulating pumps, air receiver and fuel tank, mounted on self-propelled crawlers.

Further details on this and other Schramm Fordair compressors are contained in a new catalog No. 4215, copies of which may be secured by those interested direct from the manufacturer.

### Non-Skid Surfacing With Rock Asphalt

An interesting experiment with rock asphalt as a thin surface coat to produce a non-skid pavement has been tried with considerable success in Ohio, following in general the methods used with great success in Kentucky for the past few years. The only difference is that the Ohio treatment is somewhat thinner.

The pavement to be treated is given an application or prime of 0.03 gallon of asphalt emulsion per square yard. This light application looks like dots on the

road but is soon spread out to a thin film, and is sufficient to make the rock asphalt stick when applied at the rate of 5 pounds per yard. The rock asphalt is loaded into dump trucks and heated to a temperature of 200 degrees F in the truck by means of steam. Four or five 1-inch pipes are drilled with 1/8-inch holes and attached to a header pipe which is laid in the bottom of the truck before it is loaded. When the truck is loaded, steam is then turned into the pipe and allowed to heat the load until the required temperature is attained. The steam-pipe assembly is pulled out before the truck leaves the point of loading.

The heated rock asphalt is then hauled to the road and applied through a spinner-type spreader at a rate of 2 1/2 to 3 pounds per square yard. Any lumps are broken up by a drag, made from a couple of pieces of guard-rail fence, which is run up and down the road at the rate of about 25 mph immediately after the rock asphalt is applied. A second application of 2 1/2 to 3 pounds per square yard is then made and dragged.

This completes the operation.

If the prime is not applied uniformly, at about the rate specified above, so that there is an excess of bituminous material, the prime will work through the thin layer of rock asphalt in hot weather, causing fat spots and destroying the non-skid quality of the treatment. The secret of applying the rock asphalt in this thin a treatment is the heating, which makes the material mealy and easy to handle through a spinner.

The cost of this type of treatment is not excessive, even though rock asphalt is an expensive material in Ohio, due to freight rates. A treatment of this kind costs 6 cents per square yard for prime and surfacing, as compared with 7 cents per square yard for standard surface treatment.

This type of treatment has not been in use very long in Ohio and may have some shortcomings, although none have thus far been observed. Some of these treatments have been down for nine months and still present a very satisfactory non-skid surface.

### Atwell Achievements Shown in Photographs

A photographic review of completed work and plans for future projects has been published in attractive form by the George J. Atwell Foundation Corp., International Bldg., Rockefeller Center, New York City. Included are scenes of the excavation and foundation work on many of the important structures in present-day metropolitan New York, including Rockefeller Center, the Hotel New Yorker, the Federal Court House, the New York Life Insurance Co. building, the West Side Highway, and the Lincoln and Queens Midtown Tunnels. The excellent photographs, together with the running comment, make an interesting record of the highlights of the Atwell organization's accomplishments during the past decade.

Utilization of the rock cliffs of the Hudson for tunnels carved out of the rock, suggested by George J. Atwell as air-raid shelters, is shown in pencil drawings at the back of the book.

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LATEST MODEL T-6-K MICHIGAN

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# Right-of-Way Costs On 3-State Highway

## Condemnations Should Be Avoided as Costly; Highway Relocation Offers Great Savings Over Widening

By DAVID R. LEVIN, Transportation Economist, Public Roads Administration

♦ PUBLIC authorities, particularly those concerned with highway transport, have known for some time that the construction of new highway facilities and the modernization of existing roads have been impeded by prohibitive costs of land acquisition and almost insurmountable legal and administrative obstacles. Yet until recently, little organized effort had been directed toward the investigation and elimination of these difficulties which, in the aggregate, constitute the so-called right-of-way problem. In 1939, the Public Roads Administration undertook a study of the Three-State Highway, so-called because the plans for ultimate development indicate it will traverse portions of Wisconsin, Illinois, and Indiana, with the dual objective of ascertaining highway right-of-way costs and revealing such land-acquisition difficulties as may be expected to occur on a long stretch of highway traversing rural, suburban, and urban areas.

### The Three-State Highway

The Three-State Highway, when completed, is to be a through route extending from Milwaukee south and east around Chicago to a point somewhere in the eastern part of Indiana. It was conceived of as a connecting artery between the larger metropolitan areas in the region, conveniently passing along the outskirts of proximate cities. Radial routes are to extend from the cities to the highway. Plans for ultimate improvements, formulated in 1926 by the Chicago Regional Planning Association and the highway engineers of Illinois, Indiana, and Wisconsin, designate a motorway of the parkway type built on a 200-foot right-of-way, and having at least four lanes. By September 1939, the land for 72 miles of this 161-mile route had been obtained. Negotiations are still under way for right-of-way on additional mileage.

Problems involved in the construction of the Three-State Highway are typical of those which must be solved in any major highway improvement. The section of highway studied is located in two states, three counties in one state

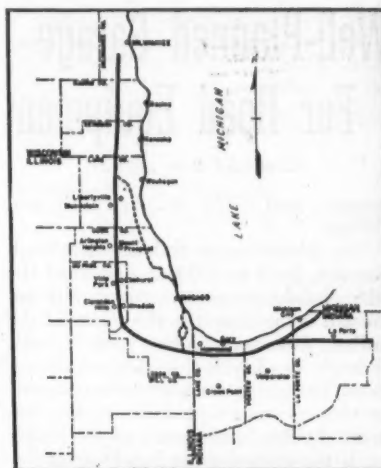
and three in the other. It traverses urban, suburban, and rural territory in which commercial and residential property and agricultural lands are represented. Right-of-way was acquired by donation, purchase, and condemnation. Some marginal or "excess" land was taken, considerably more in Illinois than in Wisconsin. Certain portions of the highway made use of existing roadway; other portions are relocations.

Local conditions have forced a modification of the original plan of having a uniform 200-foot right-of-way throughout the length of this highway. At the time of this study, Milwaukee County, Wis., had completed the widening of its portion from an existing 66-foot right-of-way to 160 feet by acquiring land on either side of the highway to a depth of

47 feet. The right-of-way in Racine and Kenosha Counties, Wis., was limited to 120 feet, but a considerable amount of land was taken for drainage channels and earth work extending beyond the 120-foot limit. In Lake County, Ill., the highway is built on a 160-foot right-of-way. In Cook and Du Page Counties, Ill., the right-of-way is 200 feet.

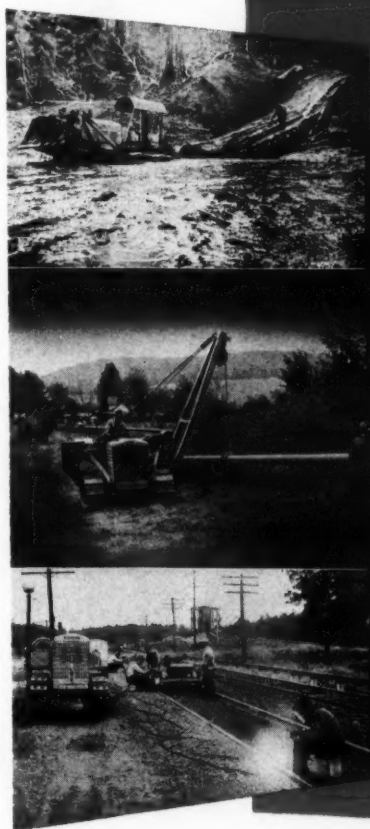
### Problems and Conclusions

**Mileages, Areas, Number of Parcels:** As of September, 1939, the right-of-way for 72 miles of the proposed 161-mile highway improvement had been obtained, involving 1,065 acres of land of which 83 per cent was rural, 9 per cent suburban, and 8 per cent urban. A total of 835 parcels was acquired, averaging 11.6 parcels per mile of road. Of the total area acquired, 67 per cent consisted of agricultural lands, 21 per cent was residential, and the remaining 12 per cent was devoted to other uses. Although commercial property represented but 2 per cent of the area acquired, it accounted for 20 per cent of the entire



The location of the Three-State Highway as originally planned.

cost (\$1,228,281) of the acquisitions. **Condemnation, Donation:** In acquiring more than 1,000 acres of land, 6 per cent (Continued on page 54)



War Demands all Sorts of Material

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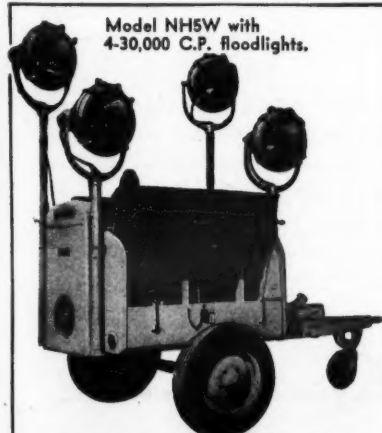
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Write for Bulletin 161  
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**CLETRAC REPORTS ON ITS WAR EFFORT**  
This folder, recently published, tells briefly of Cletrac's part in the war effort. A copy will be mailed on request.

THE CLEVELAND TRACTOR COMPANY • CLEVELAND 17, OHIO

**CLETRAC Tru-Traction TRACTORS**





## Well-Planned Garage For Road Equipment

(Continued from page 2)

summer, and roofs, etc., in spring and autumn.

The Bloomington Sub-District headquarters, built in 1934, is typical of the other headquarters structures, but because it is the closest to the center of the Indiana limestone industry, it is built of brick faced with this native building stone. The site is attractively landscaped and has a well-kept lawn facing the street. At the front corner of the building is the office for the Sub-District Superintendent and Clerk, while in the shop are the offices of the Shop Foreman and Maintenance Foreman. The balance of the front of the building is given over to the stock room.

### Stock Room

The small clean stock room contains the tire and tube racks, with a sparse stock, and then six banks of wood bins for parts. This garage had ordered regular steel bins, but the order was canceled because it was entered just at the time restrictions were placed on steel. It is interesting to note that the box for wiping cloths was padlocked. These have almost entered the state of critical materials, and the garage is allowed only 50 pounds for two full months.

In the stock room is the Equipment Location Board, a large varnished board, ruled off with painted lines horizontally and vertically. This shows the number of the patrol in the first column, followed by a series of vertical columns for trucks, tractors, graders, snow plows, concrete mixers, sand spreaders, bituminous mixers, and miscellaneous equipment. Metal-bound paper disks, each with the code number of the piece of equipment it represents, are hung on hooks across the board to show the location of equipment by patrols. Equipment which is in the garage is shown by a line across the top of the board, where disks are hung in the various columns to indicate equipment in storage or under repair.

### Garage and Shop

The garage is entered from the outside through two doorways, each 12 feet wide and 10 feet 6 inches high, equipped with overhead folding doors. It is heated by Modine unit heaters supplied with steam from an automatically stoked coal furnace in an addition to the building at the back.

At the right of the door from the office into the garage is a group of mail boxes marked with the name of each employee, so that mimeographed bulletins from headquarters and other information can be quickly distributed. A large blackboard is kept at this end of the garage and is used for special notices and also at patrolmen's meetings to illustrate the talks of the Sub-District Superintendent and others.

Across the back of the garage is a continuous work bench, with special equipment, including an Exide battery charger, a brake-facing machine, a Sioux valve facer, several machinists' vises, an

A-C spark-plug cleaner, a Marathon grinder and buffer, and a Black & Decker drill press.

At the far end of the garage a number of storage shelves have been built in, with doors so that they can be shut and locked. On these shelves, complete sets of parts of torn-down motors, transmissions, etc., are laid away until the necessary repair parts are received from Indianapolis. Another one of these closets contains the stands for the "Men Working" signs and miscellaneous iron for welding repairs. Also in this end of the shop is the blacksmith shop, with an anvil, forge, and a buffer and grinder.

Adjacent to the blacksmith shop is the greasing stand, equipped with a Graco pneumatic lubricator and an Aro pneumatic lubricator for transmissions, as well as three small Aro hand grease guns. Adjacent to this is the inside wash stand for trucks. An opening about 18 inches x 3 feet at floor level connected to a fan in the flue pulls out the fumes of engines which may be running, particularly in winter.

Two monorails attached to the steel roof trusses run the full length of the garage. The one nearer the center line has a 1-ton hoist, and the one nearer the work benches a 1/2-ton hoist.

### Paint Rooms

At the front of the garage, on the second floor, reached by a stairway adjacent to the door leading from the office to the garage, is a room for the storage of direction and warning signs and for the hand-painting operations required in refitting these signs. Here a large stock of various sizes of reflector buttons and Starlite chain reflector buttons is maintained for replacements in signs which are brought in for overhauling.

At the rear of the garage, in the addition housing the coal-fired steam boiler, is a wash and paint room for trucks, but which is used most of the time for cleaning the paint from old signs which are to be refurbished. In this room is a vat containing caustic soda for removing the paint from signs, which are then scrubbed with a wire brush by hand and

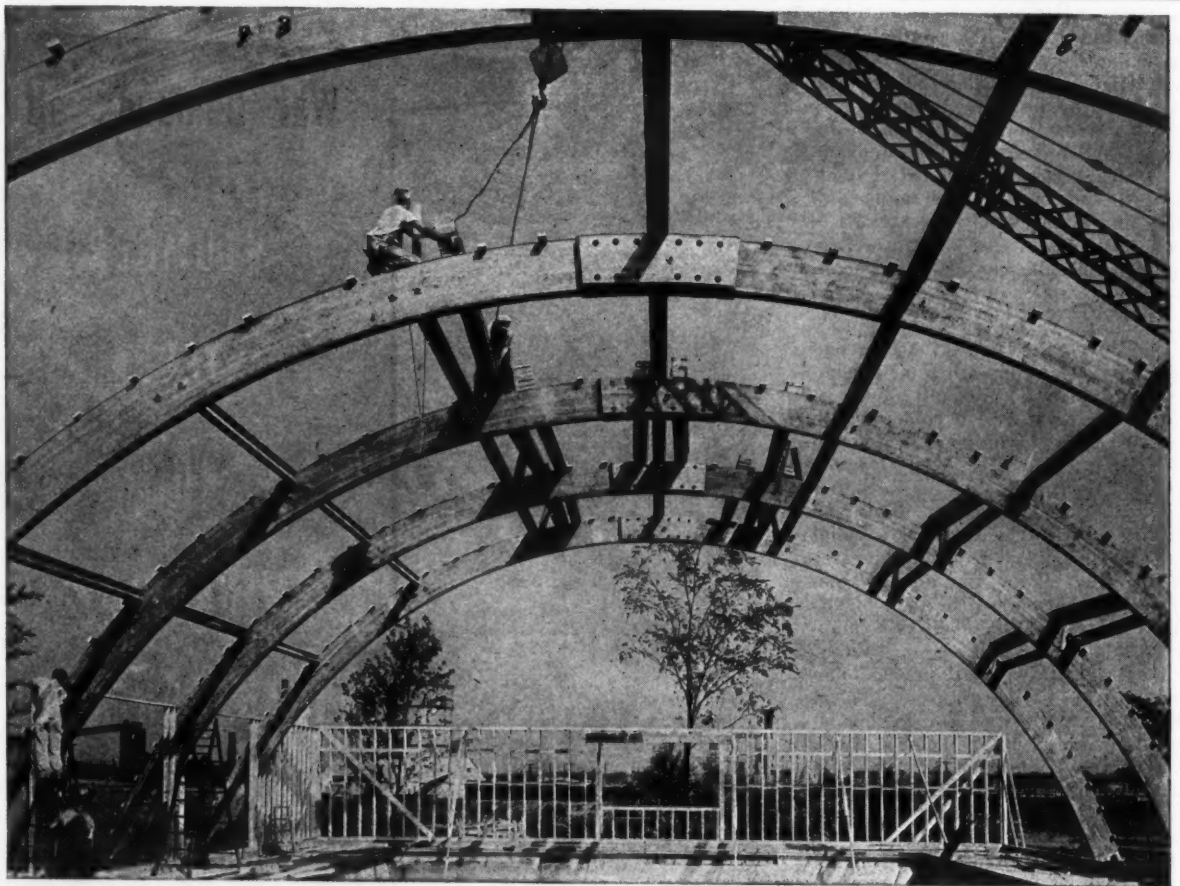
hosed off. A DeVilbiss spray-paint outfit is used for repainting the signs with the standard traffic yellow. The signs are hung in a frame in front of a suction fan, which draws off the excess paint and fumes, delivering them to the separate vent.

### Storage Garage

An 8-door wooden storage garage has been built immediately behind the Sub-District headquarters to take care of those miscellaneous items which always need inside storage. The section at the first door is used for the storage of signs which are ready to go out, either because they have been repainted or the reflector buttons renewed. The sign man's truck is stored here. This man has no other duty than to remove and replace damaged or weathered signs. He has a helper, who is rated as a painter, and when he is very busy, he also has one or two laborers.

In the next stall, heavy stock such as grader blades, hand tools, seed, and un-

(Concluded on next page)



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## A Typical Indiana Sub-District Garage

(Continued from preceding page)

opened paint are stored neatly on the floor, which is an oil-mat surface. The other six doors give access to a continuous storage area for portable tool boxes, powdered asphalt, and lumber, as well as for housing trucks and other equipment. A rotary broom which had been rebuilt at the State Reformatory was mounted in brackets on end, so that it occupied less floor space and at the same time prevented the bending of the fiber during storage.

### Outside Storage

The large yard adjacent to the headquarters building and storage garage contains a separate shed for the storage of calcium chloride, a loading ramp for drums and heavy equipment so that they may be rolled directly onto trucks, and the usual materials which are stored in an open yard, such as old equipment, gravel, rock, pre-mixed asphalt patching material, and sand.

A storage tank of 18,000-gallons capacity is located at the back of the yard and is equipped with a coil, so that the temperature may be raised by attaching a portable Cleaver-Brooks booster heater. When a tank-car load of asphalt is received, all available drums are first filled, and then the balance placed in the large storage tank by transfer to the sub-district 800-gallon distributor and then pumped into the tank. By first filling the drums, it is possible to haul out small quantities of asphalt for use with the kettles which make up a part of the equipment of the maintenance patrols.

As part of its war emergency program, the State Highway Commission of Indiana ordered a quantity of bridge timber so that sufficient could be stocked at each sub-district headquarters for replacing a 100-foot span in case of damage by flood or sabotage. The purchasing of this lumber continued until WPB cut down on purchases of bridge timber and hardware by state highway departments for other than maintenance purposes.

### Personnel

The sub-district garages of the State Highway Commission of Indiana, S. C. Hadden, Chairman, are operated under the direction of the Maintenance Division, Norman F. Schafer, Superintendent. The Architect of the Maintenance Division is M. L. Faber.

Sub-District headquarters at Bloomington, Ind., carries the accounting number "52" and is in charge of Walter Graves, as Sub-District Superintendent,



The gasoline and oil house, garage and shop, and the end of the wood-frame storage garage of the Bloomington Sub-District of the Indiana State Highway Commission.

with W. W. Bowman as Clerk and F. B. Stidd as Shop Foreman.

### A Good Resolution

Disapproval of shifting the responsibility for public works of local benefit only from the state, county and city gov-

ernments to the Federal government through Federal grants was voiced at the Twenty-Fifth Annual Meeting of the Associated General Contractors of America. It was stated that the practice of extending Federal aid for projects of benefit and value only to local communities tends to inefficiency in the execution

of public construction projects, to carelessness in public finance, and to lack of responsibility on the part of local public officials, and is a contradiction of the American system of local self government.

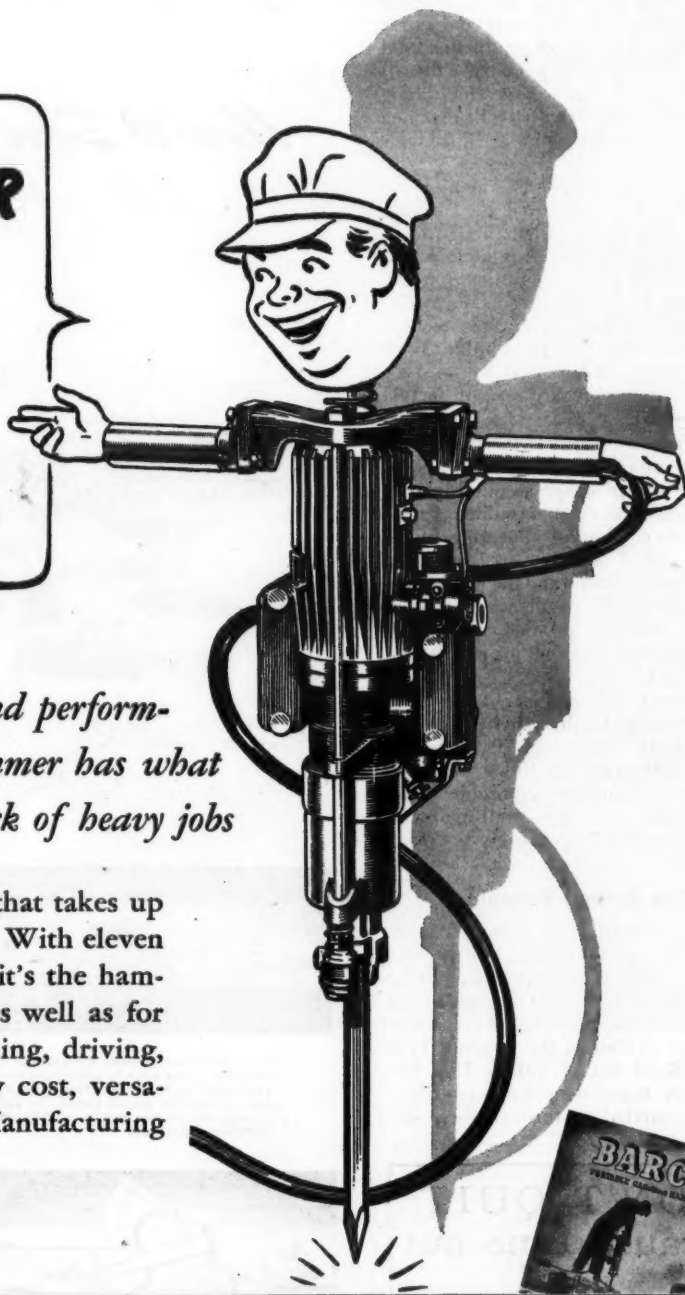
### Automatic Controls For Starting Engines

A series of eleven bulletins bound in a convenient cover, which has recently been issued by Synchro-Start Products, Inc., 221 East Cullerton St., Chicago 16, Ill., will interest all readers having present or prospective problems in automatic and semi-automatic gasoline-engine controls, including automatic starting and governors and the protection of internal-combustion engines against over-speed conditions. These illustrated bulletins contain details of operation and application of the wide variety of Synchro-Start Robot controls and may be secured free by writing to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

**"THE TOUGHER  
THE JOB,  
THE BETTER  
I LIKE IT!"**

*Rugged in construction and performance, the Barco Gas Hammer has what it takes to make light work of heavy jobs*

It's a self-contained unit that takes up little room in your truck. With eleven special tool attachments, it's the hammer for that special job as well as for regulation breaking, drilling, driving, tamping or digging. Low cost, versatile, and efficient. Barco Manufacturing Company, Not Inc.



**PILE HAMMERS  
and  
EXTRACTORS  
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Special Equipment  
Movable Bridge Machinery

Write for descriptive catalogs.

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PORTABLE GASOLINE  
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# Federal-Aid Formula As Viewed by Ohio

## New Conditions Affecting States, Counties, Cities Presented to House Roads Committee at Hearing

By HAL G. SOURS, Director, Ohio Department of Highways

† THE subject of the "formula" for Federal Aid is not a simple matter to dispose of. Different conditions in different states and the rise of new and changed problems are factors which contribute to the complexity of the problem of equitable allocation of Federal highway funds to the states.

There is a natural tendency on the part of highway officials representing the several states to work for provisions in a bill which would best meet the problems of their respective states. No one can be criticized for honestly and fairly representing his own state. In the final analysis, however, the problem will call for a meeting of minds from which there may come a solution which will give due consideration to the combined problems of all states.

We believe that Federal-Aid highway funds should be allocated by formula rather than on the so-called "need" basis. We recognize that the formula method may result in some inequities; on the other hand, such inequities as may arise would not compare with those which could arise under the "need" plan, since the latter can readily lead to pressure and favoritism, regardless of actual highway needs.

Unrestricted control of the dispensing of public funds for improvements of such wide-spread usage as our highway system would be most unsound. Under the formula method of allocating funds, members of Congress are protected from pressure groups and the condemnation which might result when a Congressman does not produce the needed funds for some favored project in his district.

The almost universal use of our highways directly and indirectly by everyone in their daily lives makes it important that the allocation of funds be on a well-defined, fair and equitable plan, subject only to such well-regulated changes as may be adequately provided for by law.

### The Present Formula

Briefly reviewing the history of the "formula", we find that the present formula, which gives equal weight to each of three factors, area, post-road mileage and population in the respective states, was written in the original Federal-Aid Road Act of 1916. This formula, with some temporary modifications, has carried on through each suc-

cessive enactment of Federal-Aid highway legislation. A great amount of study was given to various possible factors which might have been worth considering before the adoption of the formula in 1916. In the final selection, it was determined that, whatever factors were used, they should be readily ascertainable. In considering changes in the formula, it would be well to adhere to this fundamental concept that all factors be readily ascertainable and not subject to shifting items difficult to predict.

In 1921 there was adopted a provision that no state should receive less than one-half of one per cent of each year's allotment. In 1933, special emergency road funds were provided in an amount not less than \$400,000,000. This authorization carried with it a modifica-

tion of the formula, providing that seven-eighths of the total fund should be apportioned in accordance with the original Section 21 formula and one-eighth in the ratio which the population of each state bears to the total population of the United States.

In 1936, special authorization was first provided for railroad-grade-crossing elimination funds. These special funds were apportioned to the states one-half on the basis of population, one-fourth on mileage of the Federal-Aid highway system, and one-fourth on railroad mileage. So much for the history of the formula and the modifications.

### Benefits of Federal Aid

In the beginning and for many years thereafter, the prime purpose of and need for Federal Aid for highways was to enable the states and the Federal government to develop a system of main highways between the principal centers of population without regard to state lines and to assist the states in completing their inter-city routes within the

states. Good progress has been made on this problem although there still remains an enormous amount of construction and reconstruction to be done.

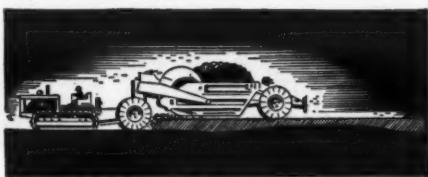
Federal Aid to the states, however, accomplished more than the building of additional mileage. It brought up the standard of work being done by the state highway departments and forced the weaker departments to organize and staff themselves so that they could perform more satisfactory work. It also brought about a greatly improved standardizing of designs and specifications. Should Federal Aid be abandoned, there would in due time, through changing state administrations, be a tendency in some states to slide backward rather than to progress.

### Changing Conditions

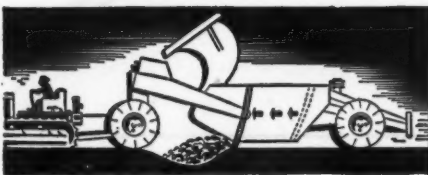
We come up to the present with some new problems on our hands, or rather we have arrived at a point where some of these problems which have been growing for some time must be tackled.

(Continued on page 50)

## How to Save Equipment and Manpower on LEVELING and GRADING JOBS



To carry an even spread, the operator must lower the cutting edge to compensate for the extra height as the scraper's rear wheels climb onto the material spread ahead. The cutting edge in this manner acts as a strike-off in controlling the spread.



A reasonably good job of rough finishing can be accomplished with a scraper by pulling the rear gate to the front of the bowl and using it as a dozer blade to drift the material ahead into low spots. Try this money-saving idea on your next job; it works!



Wherever big yardages of dirt are involved, more and more contractors are finding it profitable to handle the complete job of leveling and rough grading with LaPlant-Choate "Carrimor" scrapers. On airports, highways, large building and irrigation projects, "Carrimors" permit more flexible operation because they dig, haul and spread their own loads. In addition, "Carrimors" carry the grade straight through in lifts of any desired depth, compacting the material as they travel over it. Result: your job is completed faster with fewer men—often without need for extra hauling, spreading and rolling equipment. See your LaPlant-Choate "Caterpillar" distributor today for complete details, or write for additional information. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa.

### New Developments Coming!

In the near future, LaPlant-Choate will announce a new line of improved cable end hydraulic scrapers, engineered exclusively for all sizes of "Caterpillar" track-type and rubber-tired tractors. These new LaPlant-Choate units will offer improvements never before dreamed of in the earth-moving industry—faster loading . . . quicker, cleaner dumping . . . lower costs per yard of material moved. Tomorrow more than ever before, you'll find that "you profit more with a Carrimor."

## WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company

32-36 Dey Street  
New York, N.Y.

Hayward Buckets



LAPLANT-CHOATE

Earthmoving and Land Clearing Equipment



### Some Trucks Available For Civilian Purposes

In view of the increasingly urgent need for trucks for essential civilian uses, the War Production Board has authorized the limited manufacture of certain types of trucks for commercial use. Under this authorization, new Mack trucks are being produced in models ranging from 9,000 pounds gross vehicle weight up to the largest off-highway vehicles capable of hauling 50 tons on a single trip, according to a recent announcement by Mack Trucks, Inc., Empire State Bldg., New York City. This

type of manufacture is expected to reach its peak shortly, and at the same time Mack trucks for military purposes continue to be turned out in increasing numbers.

The civilian pool of trucks will be made available to users who can obtain a certificate of transfer from the War Production Board.

### Safe Wire Rope Clamp

#### Described in Folder

Safety, security and simplicity are stressed in a recent folder on the Safe-Line wire rope clamp, which is made of

high-tensile-strength alloy-steel forgings, and designed in two halves with large grooves to hold the large spiral strands of the rope from end-wise slipping, and small grooves to prevent spiral winding out of the clamp. Another feature mentioned in the folder is the smooth outer surface, which completely covers the sharp ends of wire, and has no projecting bolts or nuts to injure the hands. Safe-Line clamps are made in stock sizes for wire ropes of 1/16 to 3/4-inch diameters, and are available in plain forge finish or cadmium plated.

Copies of this folder may be secured direct from the National Production Co.,

Safe-Line Clamp Division, 4559 St. Jean Ave., Detroit 13, Mich.

### Texas Sales Office

#### Opened by Heil Co.

According to a recent announcement, the Heil Co. of Milwaukee, Wis., manufacturer of earth-moving and highway construction equipment, now has a sales office at 1700 Commerce St., Dallas, Texas, headed by its southwest representative, Howard Mann. The new office will handle the company's complete line, including truck bodies, hoists and road machinery.



**THE "Caterpillar" Diesel Engine** is all-time bare-knuckle champion in its class. It packs more power and can take more punishment than any other heavy-duty engine of its size.

No other Diesel built can match the simplicity of this engine — important now, when skilled operators are scarce. It's as nearly fool-proof as an engine can be made. There are only three simple operating adjustments—valves, fan-belt and water pump.

From fan to flywheel, the whole engine is "Caterpillar"-built. The fuel system is typical of sound "Caterpillar" design and construction. It requires no adjustments whatever. It can burn any type of fuel that's handy, from cleaned crude oil out of a pipeline to high-octane gasoline. And its fuel economy is famous the world over.

"Caterpillar" Diesel Engines are built for full-load, full-time work —

for more productive hours on the job and longer life. They have positive protection against dust, mud and water.

Ease of servicing is a big factor in their favor. Every part that is subject to wear can be replaced with a minimum of labor and expense.

Because "Caterpillar" Diesel Engines are used to power so many different types of equipment — such as excavators, compressors, crushers, locomotives, gravel plants and rollers — it is possible to standardize on them and thus reduce service and operating costs. And they can be hooked up in multiple installations with no loss in

efficiency and definite advantages in work output.

Right now, "Caterpillar" Diesels are contributing millions of rugged horsepower to winning the war. With the coming of victory, our full production will once more be available for peacetime jobs. In the meantime, your "Caterpillar" dealer is fully equipped to keep your present machines in running order. Call on him for counsel and service. And if you are qualified to get a new "Caterpillar" Diesel, he will explain how you can apply for it.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

## CATERPILLAR DIESEL



TO WIN THE WAR: WORK—FIGHT—BUY U. S. WAR BONDS!



## Old Bridges Widened For Overseas Highway

(Continued from page 7)

drying in a kerosene-gas oven at a temperature of 250 degrees F. Before cooling sufficiently to condense any moisture, the beams were brush-painted with one coat of Tnemec paint and given three plies of membrane waterproofing swabbed with hot asphalt.

The spandrel walls of the old railroad arches were notched, using Ingersoll-Rand compressors and air tools. The final shaping on the bottom of the notches, which served as seats for the beams, was done to very limited tolerance by a grinding tool. The beams were then set in the notches on three layers of red lead and canvas on 10-foot 4-inch centers and the notch refilled with first-grade concrete.

### Form Erection

When the concrete placed in the notches had attained acceptable strength, 2 x 10-inch stringers were set on 16-inch centers, using 2-inch wedges between the stringers and the bottom flanges of the I-beams. A needle beam 8 inches square, attached by two clamps to the bottom of each I-beam, supported the forms for the portion of the deck which extended beyond the ends of the I-beams. On the 2 x 10-inch stringers were placed sectional forms of 3/4-inch lumber, so arranged as to be removable and reusable as a unit.

Forms for both front and back of the unusual curb were set in chair-like sections which were easily removed and reused many times. Steel road forms were set on the spandrel filling material and served as the face form for the overhanging extension of the floor system.

The unusual curb referred to above provided not only great strength and safety in the use of the bridge by traffic but was designed to provide a haven for sportsmen who will use these bridges from which to lure the fish which abound in the waters under them. The strength of the curb section, which cannot be separated from the roadway by any impact likely to be suffered, made it even more necessary to anchor the widening overhangs to the old spandrel walls. This was accomplished by the

insertion of 1-inch anchor bolts into the spandrel walls, attaching pieces of 4-inch steel channels 8 inches long to the upper ends, and encasing both bolt and channel in the concrete of the widened roadway section. A photograph accompanying this article shows clearly the details described above. A Farmall tractor equipped with a light-weight built-on-the-job stiffleg derrick was very useful in removing and loading the form sections.

### Concrete

Cement from the Florida Portland Cement Co. was shipped by rail to South Miami and hauled to the batching plant locations by covered semi-trailers. Sand from Lake Wales was delivered by rail to South Miami, barged to the unloading site at Niles Channel on Ramrod Key and trucked from there to the contractor's proportioning plants on Ramrod Key and Sugarloaf Key. Coarse aggregate was quarried by the contractor from a pit on Big Pine Key and delivered to the proportioning-plant sites in trucks.

Sea water, the use of which was permitted in the concrete, was of course readily available at the point of mixing. Reinforcing steel was secured and delivered in the same manner as the structural steel.

The contractor set up proportioning plants, using Blaw-Knox two-compartment bins, fed by a 3/4-yard Northwest crane, at both Ramrod Key and Sugarloaf Key and hauled in twenty 2-batch trucks to a Rex 27-E paver. Sacked cement was carried on each batch. The Rex paver, traveling on the spandrel fill, deposited concrete in alternate monoliths on the roadway extensions. The overhanging monoliths on both ends of each pair of transverse I-beams were poured at the same time, and a pre-molded expansion joint 3/4 inch thick was set between the monoliths. After the second trip over a bridge, which completed the pouring of all overhanging monoliths, the subgrade for the center section, which was supported solely by the spandrel filling material, was prepared, and on the third trip through,

the paver completed the regular paving section, 6 inches in thickness and 10 feet 6 inches wide. This center section was reinforced with 3/8 and 1/4-inch steel on 12-inch centers.

After the forms for the overhanging extensions had been pulled and the spans swung, the guard-rail posts were poured, with the ends of the precast guard rails inserted into the post forms and the concrete surfaces separated by roofing felt.

All concrete was cured by an application of Ritecure, applied by a portable spray gun.


### Waterproofing

Since the nature of the job had eliminated the necessity for any scaffolding under the bridge, the application of the specified waterproofing to the under side of all exposed concrete presented something of a problem. The contractor solved this by an ingenious device which is worthy of special mention. (See photos on page 80.)

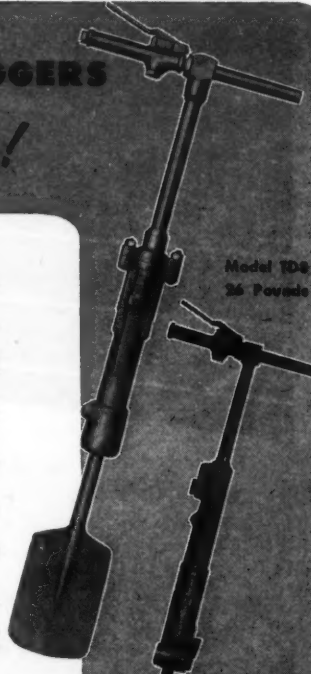
(Concluded on next page)

## CLEVELAND CLAY AND TRENCH DIGGERS

### Take it Out in a Hurry!




Model CD8  
Weight, 22 Pounds




Model TD8  
26 Pounds

★ For loosening up hard ground or tough clay, these tools are real time and money savers. There are four types to choose from—a good digger for every condition. Model CD8 is recommended for average work, for caisson jobs, wall trimming, and similar digging. The TD8, with the extension handle, is just right when the operator has a chance to stand erect in his work. C10D, with the spade handle, and the C10E long-handle digger, are for the tougher job.



Model C10D  
29 Pounds



Model C10E  
36 Pounds

## MARVEL-KOTE MEMBRANE CURING COMPOUND FOR ALL CONCRETE SURFACES

Meets Federal and State Specifications

ALSO

SUBGRADE PAPER  
meeting Federal and State  
Specifications  
WATER-PROOFING  
SPECIALTIES

CONCRETE CHEMICAL CO.

338 Railway Exchange Bldg.  
Kansas City, Mo.



Cleveland No. 5 Back Fill  
Tampers weighs 30 lbs.  
with butt.

## CLEVELAND BACKFILL TAMPERS

### Ram all the Dirt Back Firmly!

★ Whenever construction work or paving must proceed immediately after back-filling, Cleveland Tampers will prove to be the answer to your problem. They ram the earth even firmer than it was originally, making it safe for your job to go ahead. And you won't have any dirt to haul away!

Bulletin 128 provides full information on the Cleveland Line of Diggers and Tampers. Promptly sent on request.

### BRANCH OFFICES

Birmingham, Ala.	Dallas, Texas	Los Angeles, Calif.	Salt Lake City, Utah
Boston, Mass.	Denver, Colo.	Milwaukee, Wis.	San Francisco, Calif.
Buffalo, N. Y.	Detroit, Mich.	New York, N. Y.	St. Louis, Mo.
Butte, Mont.	El Paso, Texas	Philadelphia, Pa.	Wallace, Idaho
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### CANADIAN DISTRIBUTORS

Purves E. Ritchie & Son, Ltd., 658 Hornby Street, Vancouver, B. C.

Cleveland Rock Drill Factory People are buying regularly U. S. War Bonds and Stamps.

## THE CLEVELAND ROCK DRILL COMPANY

Division of The Cleveland Pneumatic Tool Company

CLEVELAND 5, OHIO





C. & E. M. Photo

Forms for the double curb and hand-rail posts, with reinforcing for the bridge widening in place ready for pouring.

this contract are as follows:

Superstructure concrete	12,072 cu. yds.
Cement concrete pavement	24,458 sq. yds.
Concrete hand-rail	43,417 lin. ft.
Reinforcing steel	2,001,465 lbs.
Structural steel (I-beams)	2,127,335 lbs.
Waterproofing of concrete	25,707 sq. yds.
Membrane waterproofing (I-beams)	15,073 sq. yds.

#### Personnel

The contract for this work was awarded by the Florida State Road Department to Cleary Brothers Construction Co. of West Palm Beach on its bid of \$889,361.43. Construction was supervised by W. C. Carter, Project Engineer for the Florida Road Department, and superintended for the contractor by J. H. Langford.

#### Asphalt Institute Officers

At the annual meeting of the Board of Directors of the Asphalt Institute, Herbert Spencer was re-elected President of the Institute and Bernard E. Gray was re-elected General Manager-Chief Engineer. George R. Christie, Standard Oil Co. of N. Y., was re-elected Secretary and Treasurer, and John N. Smith of the

same company continues as Assistant Treasurer.

The following Executive Committee was elected: F. V. Widger of The Texas Co., Chairman; J. A. Blood, Standard Oil Co. of California; F. R. Field, Standard Oil Co. of New Jersey; A. M. Maxwell, Standard Oil Co. of Ohio; H. B. Pullar, Berry Asphalt Co.; D. D. Williamson, Talco Asphalt & Refining Div., Southport Petroleum Co. of Delaware; and H. R. Pauley, The Petrol Corp. Newly elected Vice Presidents, with their respective regional jurisdiction, are: F. R. Field, Atlantic Seaboard-Southern; A. M. Maxwell, Ohio-Great Lakes; H. B. Pullar, Midwest; D. D. Williamson, Gulf; and H. R. Pauley, Pacific Coast.

New companies elected to membership are: The Derby Oil Co., Wichita, Kans.; Lion Oil Refining Co., El Dorado, Ark.; and the Skelly Oil Co., Tulsa, Okla.

Paper is vital to the war effort, and we are facing a critical shortage. Your waste paper can help!

## New Route to Key West Built on Old RR Spans

(Continued from preceding page)

A welded framework of steel tubing was constructed of such dimensions that when mounted on four automobile-tired wheels, placed parallel to the hand-rails and run in close proximity to the curb, the upper framework was above ordinary traffic and permitted use of the bridge while the device was in service.

Suspended from cantilever arms, extended beyond and above the bridge railing on both sides of the bridge, were two welded steel frames, each of which supported a working platform 5 feet below the bottoms of the bridge's transverse I-beams. The overhanging platforms were connected by cables to hand-operated winches so that they could be swung upward and through an outward arc to an inward position when it was necessary to move the entire device to another bridge. The automobile wheels could also be released and operated as casters, so that the entire device could be turned through an angle of 90 degrees and pulled down the road, from bridge to bridge, without offering any more obstruction to traffic than that offered by a long truck and trailer. For the short moves incident to the application of waterproofing to one bridge, the entire framework could be pushed by the painting crew without raising the platforms from working position. Signs, reading CAUTION, Men Working Underneath, were displayed on both sides of the device in a position to warn oncoming traffic.

All under-surfaces of the new concrete which were exposed to the action of sea water were painted with six coats of water-gas tar, five coats of prime and one of seal. The overhanging sections of the transverse beams, likewise exposed to the action of sea water, were covered with one coat of red Tnemec paint and two coats of black Tnemec. It was specified that each coat be thoroughly dry before the succeeding coat was applied. All painting was done with brushes by men standing on the working platforms of the steel framework previously described. In most cases the waterproofing applied at one end of the bridge would dry before the other end had been painted, so the only delay occurring be-

tween the application of successive coats was the time required to roll the scaffolding back to the starting end.

#### Major Quantities

The major items of work comprising

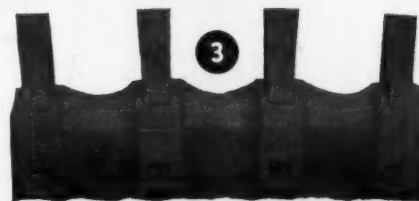
## The scientific design of



We operate the largest and most complete manganese steel foundry in the United States.

3/4 YD. WELDED DIPPER

- 1 The one-piece, full length front is made of manganese steel (12% to 14% manganese) that develops a tensile strength up to 140,000 lbs. This provides a foundation of great strength for the dipper and allows greater latitude in the location of corner teeth.
- 2 Teeth located in extreme outer corners of lip assures wide bites which reduce digging resistance of lip.
- 3 Tapered socket type teeth are kept tight continually by digging pressure, but are easily removed by light tapping from behind. No stress on the key at any time.
- 4 Cradle in digging side permits easy handling of large rocks and concrete slabs too big to enter dipper.
- 5 Hinges placed wide apart give greater strength to the door and are set ahead so that door has easy and positive latching.
- 6 Curved door eliminates usual void or "hard-to-fill" corners of the square box type dipper. Failure to get a completely filled dipper wastes about 10% capacity.
- 7 Tapered sides and back and the curved door provide a large discharge opening that assures faster dumping — saves time in handling wet, sticky material.
- 8 Latch mechanism is of very heavy duty construction. Latch keeper is cast integral with front and has easily renewable wearing piece.



**PETTIBONE  
MULLIKEN  
CORPORATION**

Established 1880

4700 West Division Street, Chicago 51, Illinois

### SAND'S Aluminum Line & Surface LEVEL



Endorsed and Adopted by Road  
Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

**SAND'S LEVEL & TOOL CO.**  
8531 Gratiot Ave. Detroit 13, Mich.



### New Company Handles Construction Supplies

Announcement has been made of the organization of the Richkraft Co., with offices in the Builders Bldg., Chicago, and in Westport, Conn., for the marketing of concrete curing compound, heavy-duty curing paper, reflecting paint, joint sealer, building paper and similar products for the construction industry. Franklin A. Richards, formerly with the Sisalkraft Co. for fifteen years, is senior partner and General Manager, E. M. Reynolds, formerly Eastern Sales Manager for Sisalkraft, is junior partner and

### Eastern Manager.

Included in the lines handled by the new company are the Prismo Life Line traffic paints in the New York, Minnesota, Iowa, Nebraska, Montana and North Dakota territories, and Prismo reflecting runway markers in New York, New Jersey, Minnesota, Iowa, Montana and North Dakota. It is also agent for the Sealz compounds, made by the Dispersion Process, Inc., Naugatuck Chemical Division of the U. S. Rubber Co., in the states of New York, New Jersey, Pennsylvania, Maryland, Delaware, Illinois, Wisconsin, Michigan, Indiana, Ohio, Kentucky and West Virginia.

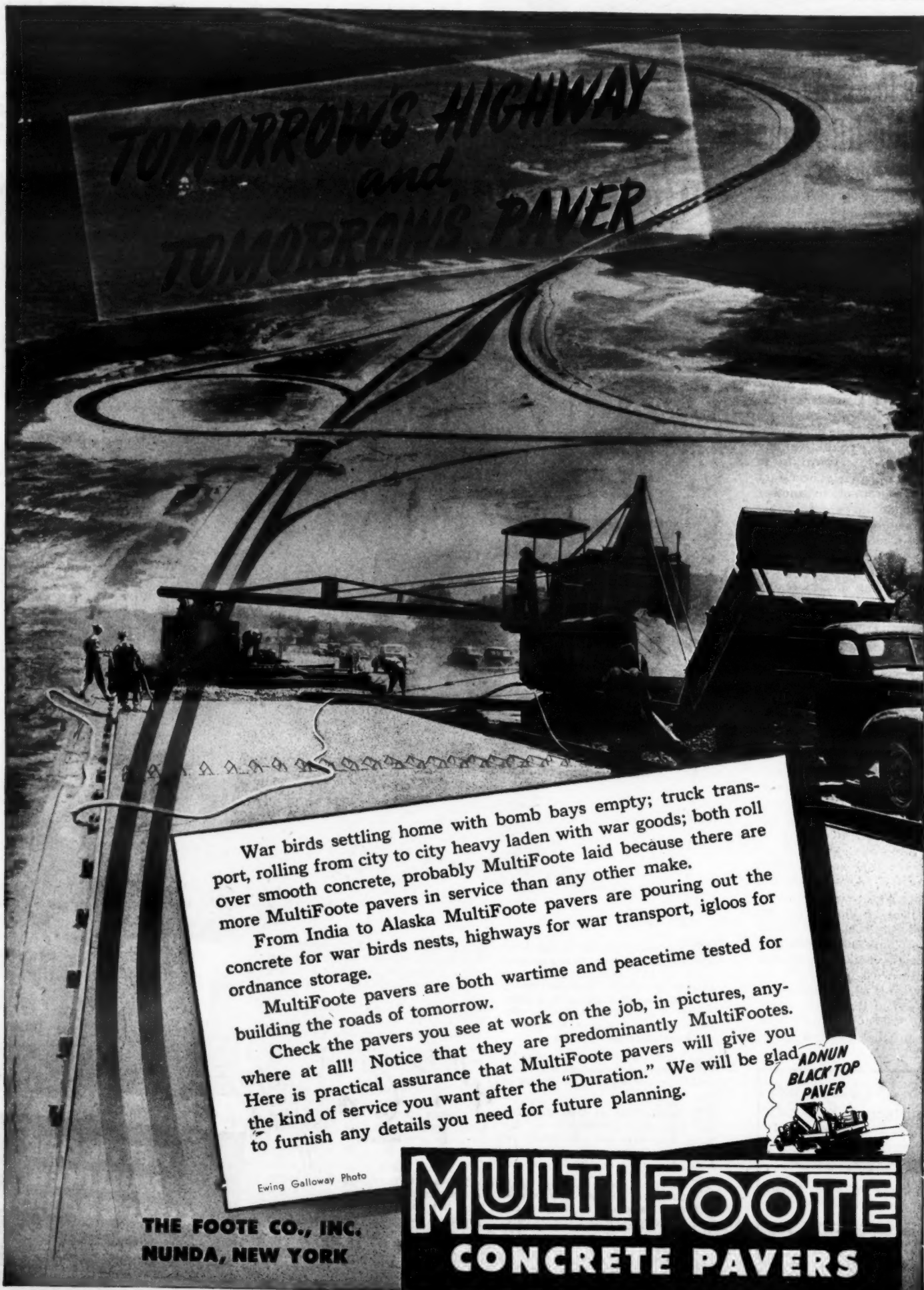
### Dustproofing of Roads With Calcium Chloride

The use of calcium chloride as a dustproofing agent on roads, airports, loading and delivery areas, etc., thereby reducing the incidence of dust-borne bacteria, sun glare, and chuck-holes and frost heaving in pavements, is discussed in a folder recently received from the Wyandotte Chemical Corp., Wyandotte, Mich. The folder gives a table indicating the amount in pounds of calcium chloride to be used per square yard for different types of surfaces, and also contains a table giving a simple

method of computing the amounts required for different sized jobs. Directions for applying, most favorable conditions, etc., are also included.

Copies of this folder may be secured by highway engineers and other interested persons by writing direct to the manufacturer and mentioning this publication.

Indiana has spent \$400,000,000 on its state highway system since its inception and reported to the state legislature recently that its present needs for bringing the system up to modern standards are \$160,000,000.



**TOMORROW'S HIGHWAY and TOMORROW'S PAVER**

War birds settling home with bomb bays empty; truck transport, rolling from city to city heavy laden with war goods; both roll over smooth concrete, probably MultiFoote laid because there are more MultiFoote pavers in service than any other make.

From India to Alaska MultiFoote pavers are pouring out the concrete for war birds nests, highways for war transport, igloos for ordnance storage.

MultiFoote pavers are both wartime and peacetime tested for building the roads of tomorrow.

Check the pavers you see at work on the job, in pictures, anywhere at all! Notice that they are predominantly MultiFootes. Here is practical assurance that MultiFoote pavers will give you the kind of service you want after the "Duration." We will be glad to furnish any details you need for future planning.

**ADNUN BLACK TOP PAVER**

Ewing Galloway Photo

**THE FOOTE CO., INC.**  
**NUNDA, NEW YORK**

**MULTIFOOTE**  
**CONCRETE PAVERS**



# Aggregate Controlled For Better Concrete

## Oregon Studies Effect of Coarse Aggregate Grading On Uniformity of Portland- Cement Concrete

By N. M. FINKBINER, Engineer of Materials, Oregon State Highway Commission

THE uniformity of portland-cement concrete depends on the uniformity of grading and free moisture in both fine and coarse aggregate, on a constant cement content, an unvarying amount of water in each batch, on a closely controlled mixing time, and on the condition of the blades and buckets in the mixer. The Oregon State Highway Commission has been studying the improvement in the uniformity of concrete brought about by a closer control of coarse-aggregate grading. The results of this special study are discussed in this article which covers the period from 1929 to date.

Contracts requiring different coarse-aggregate-grading separations were used for the comparison. In each contract the test results of the 28-day 6 x 12-inch cylinders were averaged and the percentage of tests deviating more than 15 per cent above and below the job average was computed. An allowable variation of 10 per cent in the individual strengths of mortar cubes above or below the average for the set is permitted by A.S.T.M. C 109-37T (Compressive Strength of Cement Mortars). This allowable variation is on laboratory-controlled and prepared specimens. Therefore, in the data which follow, 15 per cent permissible variation was allowed, since the cylinders were cast on the job by inspectors without the refinement available in the molding of laboratory specimens.

### Pre-1929 Gradations

In the first tests, Group A, four contracts were included which were completed just prior to the 1929 changes in specifications. The coarse aggregate in the one stockpile varied from 3-inch down to 1/4-inch. Prior to 1929 the Oregon specifications for concrete pavement required that all the coarse aggregate should pass a 3-inch square-hole screen and be retained on a 1/4-inch screen. Within this range the material was required to have the following gradation:

Passing the 3-inch and retained on 2-inch	Per Cent
Passing the 2-inch and retained on 1-inch	0-15
Passing the 1-inch and retained on 3/4-inch	35-55
Passing the 3/4-inch	0-10

This grading standard could not always be obtained in each batch of concrete since segregation started at the first handling of the aggregate and was progressively more pronounced until the material was in the mixer.

The second set of four contracts, Group B, was completed immediately following the change in specifications in 1929 which required two stockpiles varying from 3-inch down to 1 1/2-inch and from 1 1/2-inch to 1/4-inch. The 1929 specifications for the gradation of coarse aggregate for concrete pavement were as follows:

Retained on the 3-inch screen	Per Cent
Retained on the 2-inch screen	0
Retained on the 1-inch screen	0-15
Retained on the 3/4-inch screen	35-65
Retained on the 1/2-inch screen	90-100

This specification, however, carried the following clause, "The coarse aggregate shall be separated into two bins, one bin containing the materials above 1 1/2-inch size, and the other containing the materials below 1 1/2-inch size".

### Later Specifications

Group C is the same as Group B except that the contracts taken for comparison were completed just prior to the 1939 change. Group C follows Group

B by about eight years.

Group D comprises four contracts completed immediately following the 1939 change in specifications when three stockpiles were used, sized 3-inch to 1 1/2-inch, 1 1/2-inch to 3/4-inch, and 3/4-inch to 1/4-inch. In 1939 the specifications for coarse aggregate for concrete pavements were further modified, requiring that the coarse material conform with one or the other of the following tables as regards size and grading:

1. 3/4-3-inch material retained on 3-inch	Per Cent
Passing 3-inch, retained on 1 1/2-inch	0
Passing 1 1/2-inch, retained on 3/4-inch	30-50
Passing 3/4-inch, retained on 1/4-inch	20-35
Passing 1/4-inch	0-10

2. 3/4-2 1/2-inch material retained on 2 1/2-inch	Per Cent
Passing 2 1/2-inch, retained on 1 1/2-inch	0
Passing 1 1/2-inch, retained on 3/4-inch	20-45
Passing 3/4-inch, retained on 1/4-inch	22-42
Passing 1/4-inch	24-41
Passing 1/4-inch	0-10

The 1939 specification further requires that, "The coarse aggregate shall be separated into three sizes, and each size shall be separately measured into the batch in the quantity determined by the engineer to be necessary for satisfactory compliance with the specified grading requirements. The screen sizes at which the separations are to be made are 1 1/2-inch, 3/4-inch, and 1/4-inch".

### Improvement in Results

The successive improvement in uniformity in tests of concrete cylinders is shown in the following table:

Coarse Aggregate	Percentage of 28-day Cylinders More Than 15 Per Cent Above or Below Job Average
Group A	34.6
Group B	28.8
Group C	25.6
Group D	16.3

The slightly better results of Group C over Group B are probably due to improvements in specimen-molding manipulation and increased attention to details of batching and mixing on the job during the time interval (about eight years as noted above). While it undoubtedly

cost the contractors more to separate the coarse aggregate into three sizes, the increase was not discernible in the bids submitted, due at least in part to the gradual manner in which the changes were made.

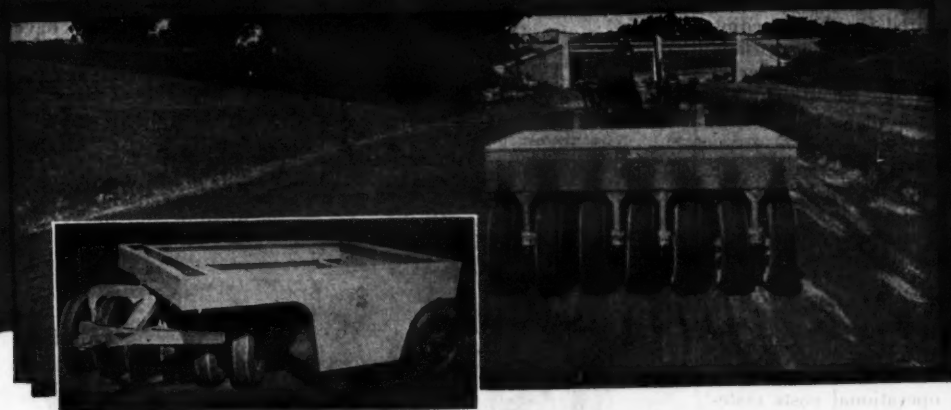
These studies indicate that the separation of the coarse aggregate into at least three sizes is one of the factors which promotes the attainment of more uniform concrete.

## Mud-Jack Operations On Illinois Highways

Ten Mud-Jack units were employed to correct pavement settlements caused by subgrade failures at 3,882 locations on Illinois highways during 1942, according to the 25th Annual Report of the Illinois Division of Highways. This represented a total area of 209,874 square yards of pavement, and the cost of these operations, not including equipment depreciation and overhead charges, amounted to \$61,264.60, or an average cost of \$0.29 per square yard.

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Wobble-Wheel Rollers are building important military and commercial air fields both here and abroad.

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# BROS Wobble-Wheel ROLLERS





# Organizing and Equipping An Airport Seeding Project

(Continued from page 11)

daily progress of the various operations, with fertilizing, disking, harrowing and floating shown by one color or type of legend; and cross-seeding, east to west and north to south, and rolling shown by a different color or legend. On this map may also be recorded the rate of fertilizer and seed application on each area. This may vary somewhat from day to day, due to the moisture content of the seed and fertilizer, and should be checked at least two or three times a day. The map should also show the dates of seeding as well as the rate of seeding.

## Size of Work Areas

The work areas which are usually included in the seeding operations at an airport may vary from 200 to 1,000 acres. The main area is usually broken up into smaller units varying from 10 to 100 acres in size, bordered by runways or taxiways, or both. They may be triangular or oblong in shape, or even quite irregular. The significant fact of these smaller areas is that, in a large measure, they determine the size of the work unit upon which the seeding and sodding operations must be based.

The best unit for seeding operations is 18 to 20 acres in size. This requires about one day for seeding and fertilizing, these operations consisting of spreading fertilizer in one direction and spreading the seed in two directions, one-half of the grass-seed mixture in each direction. It is obvious that more time will be required for these seeding and fertilizing operations on a field which is cut up into a great number of small areas than on one where the areas are 20 acres or more.

## Equipment

In the selection of equipment and personnel, it is essential to realize that, with seeding operations, intensity of work is an important factor. Since the optimum season for seed germination in certain sections of the country is quite definitely fixed, it is often necessary, when seeding large areas, to work long hours as well as seven days a week. Thus overtime increases seeding operational costs materially.

The modern tendency today is to

double up on the equipment used. An abreast hitch or hook-up of two fertilizer spreaders cuts down the time required for the spreading of fertilizer by one-third or one-half. If all work areas can be 20 acres or larger in extent, the abreast arrangement of seeders, fertilizer spreaders, disk harrows and rollers is desirable and practical. Tandem hook-ups are usually ineffective, because it is difficult to secure complete seed or fertilizer coverage when turning with this arrangement.

The cost of operations can be very materially reduced and the degree of cultivation tremendously improved if study and extreme care are given to the arrangement of the equipment pulled by the tractor. On some projects, the motive power can be reduced as much as 50 per cent, or the equipment drawn by

each tractor can be doubled or tripled. Under favorable conditions,  $2\frac{1}{2}$  to 3 acres per equipment hour may be worked, but 2 acres an hour is a fair average for normal conditions.

In general, three tractors, and one to stand by for an emergency, are essential if work must be rushed to completion. One truck is needed for hauling fertilizer and seed, and if there is to be an intensive program, an additional truck for supplemental and emergency work. One car or pick-up truck for the superintendent or foreman, two field seeders for the distribution of fertilizer and seed, two hand seeders, two tandem disks, two double harrows, two double Culti-Packers or corrugated rollers, and miscellaneous hand tools, such as rakes, shovels, forks, etc., make up the necessary equipment.

In the selection and purchase of equipment, there are two sources of supply. Farm equipment, of course, is very much more highly developed because it has passed through many more years for perfection. However, the other field,

consisting of machines for the building and maintenance of golf courses, offers many pieces of equipment well adapted for airport seeding. This is particularly true of the 10-foot broadcast seeders and fertilizer spreaders. For airports, better results are likely to be achieved with rubber-tire 10-foot power-drawn broadcast seeders than can be secured with the regular farm grain drill. On the other hand, if several operations are to be combined, such as spreading of fertilizer, seeding of nurse crops and seeding of legumes, one must use a drill which is designed for agricultural purposes. Where cross-seeding is specified, there are many advantages in using the golf-course or broadcast type of equipment, rather than the usual farm seeder.

A recent development, originally planned for the distribution of grass and leguminous seeds in sandy soils, is an attachment which distributes seed between the front and rear rollers of a power-drawn corrugated roller. Although subject to controversy, it has

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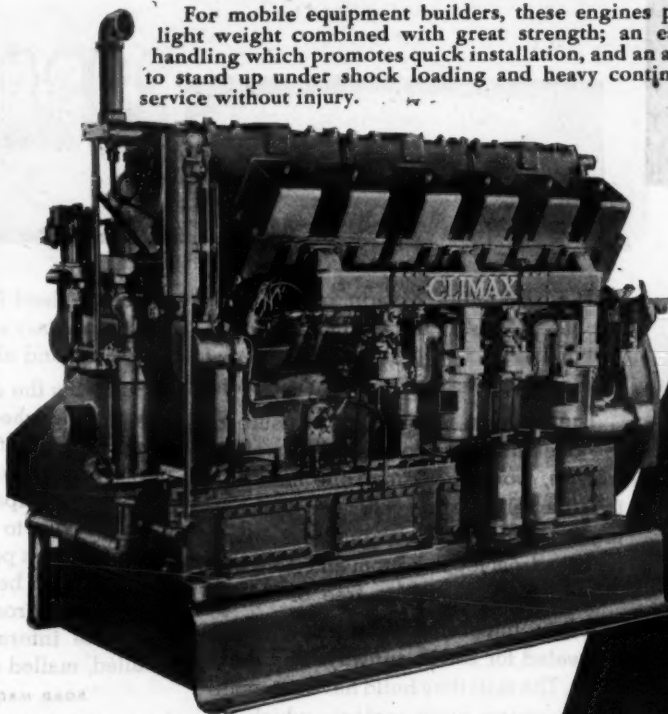
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The Climax New V12, a 12 cylinder, 7" x 7" bore, 60° V, 4 cycle type which develops 495 hp. at 1200 r.p.m. Typical uses—deep drilling, construction equipment, locomotives, pumps, compressors, generator drives.

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The Climax Model R41, a 4 cylinder 6" x 7" bore, 4 cycle type which develops 100 hp. at 1200 r.p.m. Typical uses—for cranes, shovels, draglines, snowplows, pumps, compressors and generator drives.

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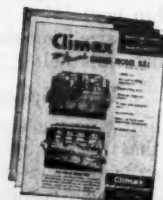
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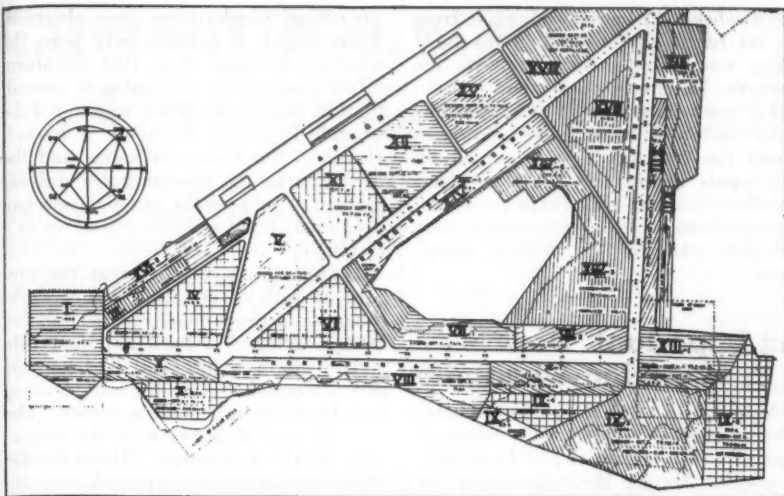
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Seeding operations should be closely coordinated with the final grading work. On this progress map, showing a seeding plan, the Roman numerals indicate areas of about 20 acres which are one day's seeding operations. On the plan is recorded, with different-colored pencils, each day's work of fertilizing, disking, and seeding, as well as the acreage and amount of fertilizer and seed used on each tract.

pits. Certain difficulties arise from these

general specifications, because topsoil from stockpiles and borrow pits often is not uniform in type. Some areas which have been topsoiled will require more disking than others, because the type of equipment used in topsoiling operations gives varying degrees of compaction. Such factors result in irregularities in the depth of the tilth.

In some soils, the ordinary disking operations will carry the tilth to a depth of 3 inches and with other types of soil only to a depth of 1 or 2 inches. Such difficulties may be overcome by adding a heavy float between the tractor and the disks. Such a device may be built of 2 x 12-inch hard-wood planks fabricated into a semi-flexible float. These floats may be weighted in order to get the desired depth and quality of tilth. If this floating operation immediately precedes the disking operation, a uniform degree of compaction is secured, with the result that the depth of tilth is much more uniform and will show up advantageously in the final operations of rolling and harrowing. This treatment will also give

much more uniform depth of seed coverage than could have been secured if such variable areas had not been floated.

#### Fertilizers and Application

Fertilizer operations should always be preceded by soil analysis to determine the kind of fertilizer to be used. War conditions have often made it necessary to specify the kind of fertilizer available, either through priority or otherwise, rather than that most desirable.

When the topsoil has been taken from adjacent fields which are producing good agricultural crops, these crops are a good indicator of the productivity of the soil. The usual rate of fertilizer application specified varies from 200 to 600 pounds per acre over general areas to be seeded to applications as heavy as 1,200 to 1,500 pounds per acre over a strip 75 feet wide paralleling runways, taxiways and apron. Wise airport planning dictates that the areas adjacent to the runways and taxiways should be

(Continued on page 60)

## Method of Preparing The Soil for Seeding

(Continued from preceding page)

been fairly definitely proved that, where no subsequent mulching is used, very shallow or surface seeding produces much better results in turf than drill seeding. The modern attachment for Culti-Packers or corrugated rollers distributes and covers the seed in this manner. This type of shallow seeder has proved equally successful on sandy loam and heavy soils.

#### Preparation of Soil

The type of equipment which is used for the excavating and grading operations in a measure determines the soil depth at which the seeding and sodding operations begin. The nature of the soil also in some measure determines the procedure which is to be followed. Sandy soil will require but one passage of a double disk, whereas if the soil is such that scrapers and blade graders leave a hard glazed surface, these areas must be given more preparation by disking than the areas which do not show such extreme compaction by the grading equipment. It is essential that this be done before the entire area is disked. The reason for this is that these areas then show up much more conspicuously, and can thus be selected and worked, than if the extra cultivation is delayed until the entire area to be seeded has been disked.

Many inspectors consider this one of the important items in the disking procedure. Perhaps for such operations an entirely different type of disk should be used. Sometimes seeding operations are specified over soils which have been stabilized. If these areas are extensive, they may be scarified with power equipment before the seeding operations are undertaken.

Most specifications require the spreading of topsoil before seeding operations begin. This is usually obtained from stockpiles on the job or, if there is an insufficient amount of suitable soil thus available, it is procured from borrow

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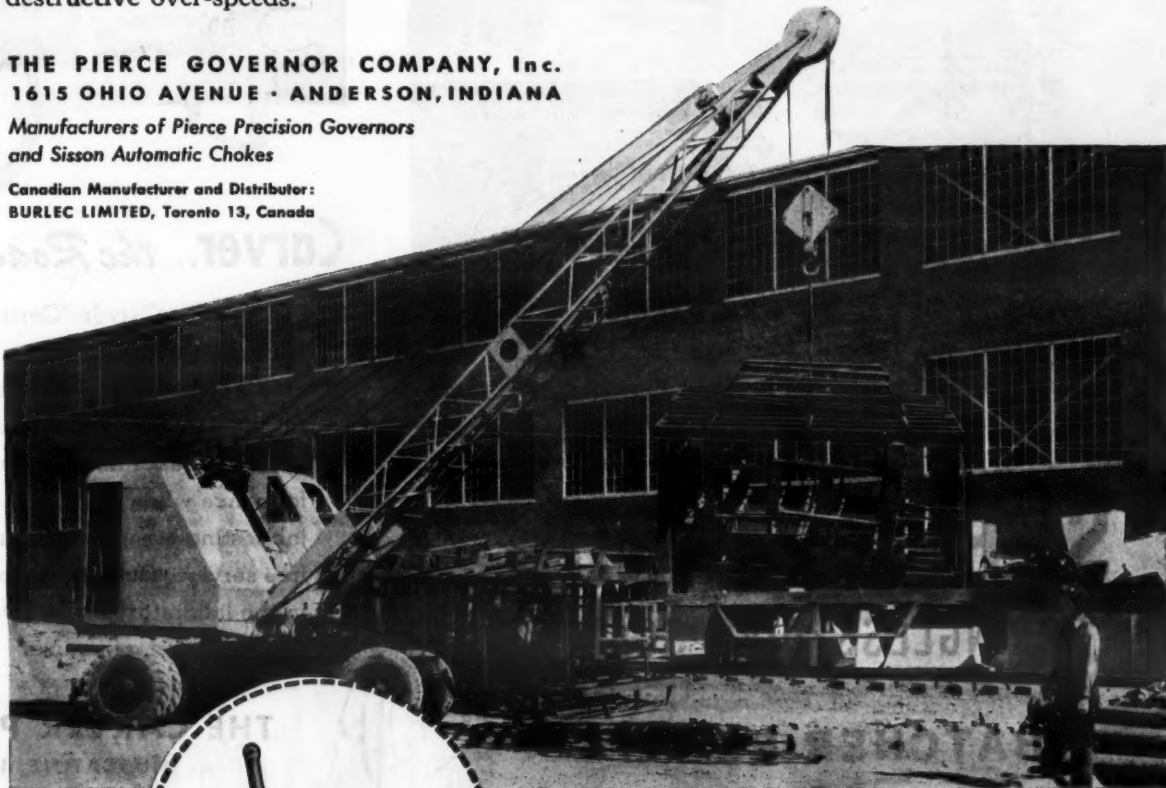
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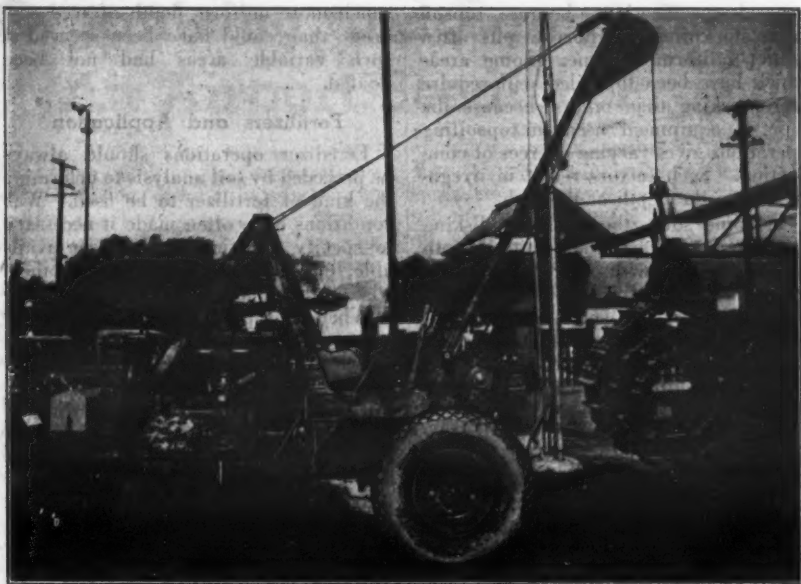
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The handy yard crane used at the Arcadia, Calif., Equipment Repair Depot of the U. S. Forest Service.

### Shop-Built Yard Crane Aids Forest Service

At Arcadia, Calif., where a central equipment repair depot maintains automotive and construction equipment used by the U. S. Forest Service in the Cleveland, San Bernardino, Angeles, Los Padres, Sequoia, and Inyo National Forests, a hybrid machine nicknamed "The Eggsucker" performs economically and expeditiously many of the jobs of heavy lifting and carrying incident to the depot operations.

Starting its existence as a standard 30-hp Caterpillar tractor, the machine rendered many months of service before its conversion, performed in the Arcadia shops. The crawler tracks were removed

and replaced by two rear wheels mounting pneumatic tires and a double-wheel caster on the front. A self-starter was installed and the addition of a ring gear on the opposite side of the pinion provides a first, second, and third gear with the machine traveling in what had formerly been reverse. The cable-operated derrick constructed of scrap pipe and angle irons is powered by a regular Caterpillar pulley power take-off V-belted to a Ford Model A differential placed upside down. The axle and axle housing were used but shortened. Two Cletrac 55 flywheels and their Borg & Beck clutches were mounted on either end of the axles and Caterpillar Fifty brake bands were used as brakes for the drums. The cable reels were welded to

the flywheels. A bucket seat, made from an oil barrel upholstered in the body shop, was mounted so as to give the operator an unobstructed view.

For easy handling of heavy repair parts and their expeditious movement about the extensive area occupied by the repair depot, this machine is an excellent example of salvage by ingenious mechanics and is considered a most valuable addition to the shop equipment.

### An Important "Don't" In Handling Dynamite

A story with a moral and, fortunately, a happy ending is told on the editorial page of a recent issue of *The Explosives Engineer*. During the construction of the Key West Highway, at a location where 15,000 pounds of 60 per cent nitroglycerin dynamite with electric blasting caps were loaded in closely spaced holes, and another 5,000 pounds were in unopened cases, signs of an ap-

proaching thunderstorm were observed. There could, of course, have been the tendency to think, first, that the storm might pass over or around and, second, that in any event there might not be enough lightning to create a hazard. However, the storm did come and the dynamite in the loaded holes did explode, but because the safe decision had been made there were no casualties as a result.

Despite the possibility that the precaution, with the resulting loss of work-time, might prove unnecessary, the contractor followed a hard and fast rule and, at the first threat of a storm, ordered everyone out of the danger area, thereby avoiding a fatal accident. The story is a vivid instance of the importance of the precaution, "Don't handle explosives during the approach or progress of an electrical storm. All persons should retire to a place of safety." This rule is one of the sixty-three in the newly-revised list of things not to do with explosives, adopted by the Institute of Makers of Explosives.



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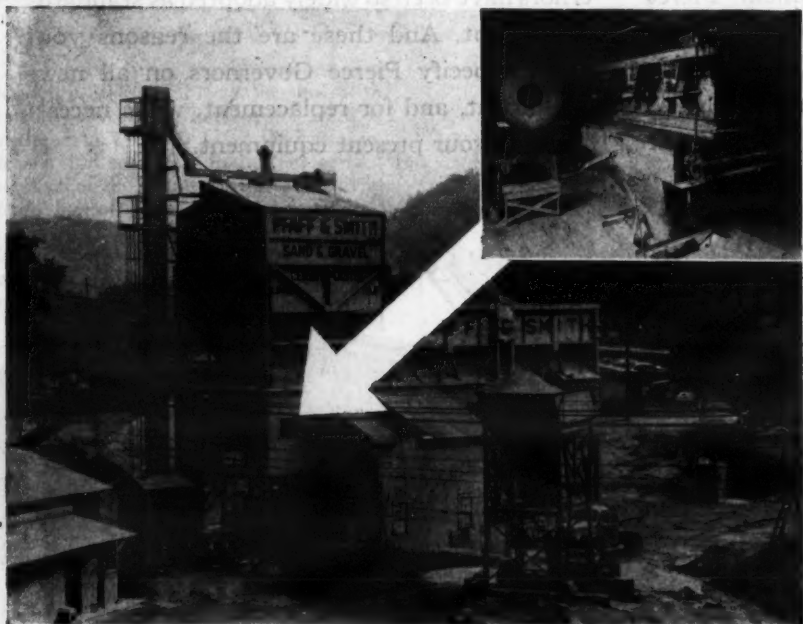


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# Current Maintenance On Minnesota Roads

## Organization, Financing And Equipment; Depreciation Scale; General Operation Under War Restrictions

THE problems of highway maintenance in Minnesota, whose 11,265 miles of road are subjected to the rigors of northern winters, are well handled by the maintenance section of the Minnesota Department of Highways. The organization and methods of carrying on this work, under the supervision of C. L. Motl, aided by a corps of able and experienced assistants, offer much of interest and help to other maintenance engineers.

### General Organization

In the central office of the Department of Highways the State Maintenance Engineer with two principal assistants, one in charge of special jobs and the other in charge of equipment, looks after the maintenance problems. Aided by the necessary clerical forces, the central-office organization approves all proposed expenditures, checks and inspects the district operations, and exercises general supervision. The entire maintenance department is under state civil service and in consequence has been able to retain a competent trained organization.

District engineers, eight in number, who are also charged with construction supervision in their districts, exercise a general supervisory authority over the sixteen district maintenance engineers who are in direct charge of operations in their districts which contain from 550 miles of road in the districts near large cities to 800 miles in the more rural districts. Each district maintenance engineer is in charge of a shop and numerous storage garages and is responsible for the servicing and repair of the equipment used in the maintenance operations in his territory.

A typical district maintenance organization is as follows:

- 1 District Maintenance Engineer
- 1 District Foreman
- 2 Maintenance Foremen
- 1 Labor Foreman
- 1 Garage Foreman
- 5 Garage Mechanics
- 2 Garage Mechanic Helpers
- 1 Mechanical Stock Clerk
- 1 Sign man
- 1 Janitor
- 24 Highway Section Men
- 24 Highway Section Helpers
- 10 Equipment Operators
- 5 Clerical Employees
- 177 Temporary Laborers

This typical district, in a metropolitan area, with Myron L. Jones as District Maintenance Engineer, conducts maintenance operations on 314 miles of concrete pavement, 145 miles of bituminous-surfaced and 66 miles of gravel-surfaced roads, totaling 525 miles of very heavily traveled highways.

### Maintenance Funds

The Minnesota 4-cent gasoline tax plus license fees is used entirely for highway purposes. All of the vehicle tax and two-thirds of the gasoline tax must, by constitutional provision, be placed in the Trunk Highway Fund and

used on the trunk highway system, while the remainder is allocated for aid to counties, as specified by law, by the State Allotment Board of which the Commissioner of Highways is a member.

Work by the state maintenance department is financed by the Trunk Highway Fund. Amounts are determined by an estimate of needs made tentatively in advance for each 2-year period, and such estimates are reported to the State Department of Administration by the Commissioner of Highways. The filing of this report does not limit the Highway Commissioner to the budget indicated if subsequently it is found that additional funds may be necessary and are available in the general highway budget. Distribution of funds among the sixteen districts is controlled by and through

the Maintenance Engineer, and such distributions are made quarterly on the basis of anticipated needs. As these allocations are made, the overall estimate for the biennium is watched carefully and followed as closely as possible, although such procedure is not mandatory. In 1942, the maintenance expenditure was \$6,382,811.42 and for the 1943 period was \$5,938,940.47.

Allotments for routine maintenance are made on an experience basis, with special authorizations for extra work initiated by the district maintenance engineer, checked and approved by the district engineer, and finally authorized in the central office, after which the State Auditor certifies that the money is available for the particular job and can be used for contracts, equipment purchase or employment of state forces. Routine maintenance of highways within their boundaries is generally sublet to major cities for \$500 per mile per year, and special "authorities for expenditures" may be made for unusual conditions arising within the cities.

County roads are financed by one-third of the gasoline tax and such additional property taxes as may be levied by the respective County Boards. In each county a limited mileage of roads is designated as State-Aid roads by the County Board, and out of the one-third gas-tax collections, \$1,200,000 is set aside each year for the specific purpose of State Aid to assist in financing this limited system under the general direction of the Department of Highways.

### Safety

In recent years considerable and special thought and attention have been given to safety in the operation of the maintenance division. At one time, not many years ago, the Highway Department was paying out industrial compensation arising from accidents to the extent of \$72,000 a year. It is believed that the careful and well-thought-out campaign of safety, combined with the policy of making yearly safety awards, which has been in existence for a number of years, has been in existence for a number of years.

(Continued on page 64)

# If you would bite out BIGGER PAY-LOADS

... put the job up to a Haiss HI-POWER Clamshell. You can tell from its picture here that there's brute strength enough to stand up to your toughest digging. But more convincing than that is the fact that the can't-be-kidded crane operators—who know a bucket for what it really can do—these men are saying right out, "Give me a Haiss HI-POWER and watch the yardage mount".

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A new type of lining for external brakes.

### An Improved Lining For External Brakes

An improved moulded brake lining with wire back reinforcement for use with external band or contracting-type brakes has been announced by the Gatke Corp., 224 N. La Salle Street, Chicago 1, Ill. This external Dura-Blok brake lining is being used on many applications, according to the manufacturer, to replace woven brake lining which is critically scarce, due to war-production requirements for large quantities of woven asbestos materials.

Rolls of Dura-Blok are furnished in a complete range of sizes up to  $\frac{3}{8}$  inch thick by 6 inches wide. This same lining for internal-type expanding brakes has been available for some time in a similar range of sizes.

Complete information regarding the new external lining may be secured direct from the manufacturer by mentioning this item.

### Aggregate Spreader With New Features

Among the features claimed for the Berna Champion aggregate spreader by its manufacturer, the Good Roads Machinery Corp., Kennett Square, Pa., are streamlined appearance, simplicity of design, keyboard feed-control gate, synchronized micrometer positive screw adjustments, needle bearings, accurate load distribution without a mechanical agitator, and natural balance. The Berna Champion is capable of spreading any type of material, from sand to 1-inch stone, chlorides or cinders, in any desired volume throughout its entire width. It is available in five models, with hopper capacities ranging from 1.12 to 1.68 cubic yards, and has spread widths from 8 to 12 feet.

The keyboard feed-control gate has a maximum  $3\frac{1}{4}$ -inch opening, and is equipped with hundreds of individual spring-steel blades, which provide constant agitation of the material, without the need of a mechanical agitator. This gives a steady uniform flow and permits easy application of even fine or damp materials. Because of the flexibility of the blades, oversize material passes through without piling up. The keyboard adjustment shafts, which extend across the entire width of the spreader, float on needle bearings. Controls for the synchronized micrometer positive screw adjustment are located on each end of the spreader to regulate the thickness or quantity of material application. Accurate distribution is assured and maintained by control of the opening and tension of the keyboard against the feed roll. Indicators show the exact position of the keyboard or the width of the opening so it is possible to close the opening entirely and then return to the original setting and be assured of spreading the same amount of material. For changing road crown or increasing bank on curves, a taper spread attachment is provided. The micrometer adjustment for the taper attachment is independent of the keyboard micrometer adjustment and can also be operated from either end.

The entire drive mechanism, transmission, gears, driving sprockets, chain and the safety clutch are completely en-

closed in a dust-proof oil-tight housing to prevent outside damage and wear. The hopper box is fabricated from 3/16-inch steel plate, rigidly braced and electrically welded into one unit. The double-chuted bottom not only guides the material but keeps it flowing steadily to the feed roll which is  $5\frac{3}{4}$  inches in diameter and made of seamless steel tubing. In addition to serving as rests when the machine is not in use, two double sets of casters are provided to help the spreader over irregularities and in backing up they roll over any obstructions. These dual pressed-steel wheels cradled amidships between self-oiling bearings are fitted with pneumatic 6.00 x 9 tires on demountable rims.

Bulletin 1879 describing and illustrating the Berna Champion spreader, and an operation and maintenance manual, may be secured by interested contractors and state and county highway engineers direct from the manufacturer. Just mention this item.

Back the Attack with More War Bonds!

### Dunlap, Early Named Wickwire Officials

At a recent meeting of the Board of Directors of the Wickwire Spencer Steel Co., New York, N. Y., R. T. Dunlap and E. F. Early were elected Vice Presidents. Mr. Dunlap, who is well-known in the steel industry as an authority on plant installations, production and operation, was previously Assistant to the President

of the Wickwire organization, and for the past few months has been acting as General Superintendent of the Buffalo plant. Mr. Early has been with Wickwire Spencer for many years and at present is General Superintendent of the Morgan Plant of the company at Worcester, Mass., which manufactures springs and wire forms. As Vice Presidents both Mr. Early and Mr. Dunlap will continue in their present positions.

### Foresight Pays DIVIDENDS

—MANY

### DAVENPORT-FRINK SNO-PLOWS



—performed their snow clearing functions without a hitch last winter BECAUSE their owners anticipated their repair needs EARLY and were READY when the snows came. We suggest equal foresight for next winter. It will be a pleasure to supply the Sno-Plow repair parts you will need for top efficiency.

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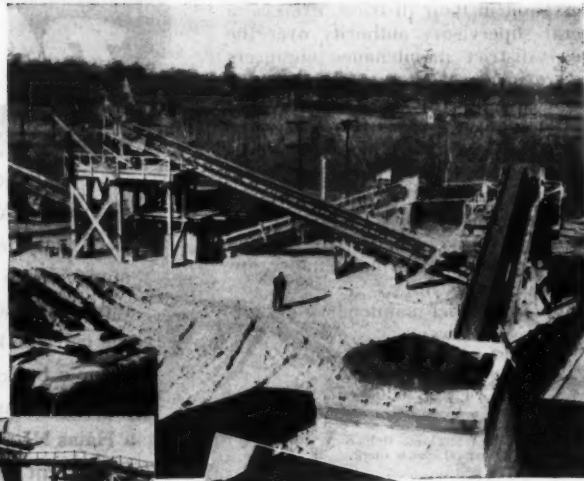
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*serving urgent war jobs*



TelSmith Jaw Crusher



TelSmith Sand Tanks



TelSmith Gyrasphere



\* Urgent war projects near Pawtucket, R. I. demand large amounts of concrete aggregate. Owned by McHale Bros., the recently built TelSmith-equipped River Sand & Gravel Co. plant at Seekonk, Mass., turns out 180 tons per hour producing minus  $1\frac{1}{2}$ " sand and gravel, 40% of total product is sand.

A  $1\frac{1}{4}$  cu. yd. shovel and two end dump trucks feed raw bank run gravel into an 8 cu. yd. hopper having a railroad rail grizzly that rejects the few oversize boulders. A  $30'' \times 5'6''$  TelSmith Reciprocating Plate Feeder feeds material out of hopper and over a No. 450 TelSmith Rotary Grizzly with  $3\frac{1}{4}''$  spaces. Plus  $3\frac{1}{4}''$  goes to an  $18 \times 30$  TelSmith Roller Bearing Jaw Crusher. A  $30'' \times 73'$  belt conveyor takes minus  $3\frac{1}{4}''$  direct from the grizzly, and from the jaw crusher, to a  $4' \times 10'$  TelSmith Single Deck Pulsator.

Plus  $1\frac{1}{2}''$  from this scalping screen goes into a No. 36 TelSmith Gyrasphere Crusher; and when crushed returns to the  $30''$  primary conveyor via an  $18'' \times 48'6''$  conveyor.

Minus  $1\frac{1}{2}''$  from the scalping screen goes via a  $24'' \times 186'6''$  finished product conveyor to a  $5' \times 12'$  TelSmith 2-Deck Pulsator for washing and sizing. Sand is flumed to two No. 8 TelSmith Sand Tanks on a tower independent of main plant. The two sizes of gravel are deposited in two  $20'$  diam. concrete-block silo bins, fitted with bin gates for loading into trucks.

Why do so many operators with war construction jobs depend on TelSmith? Because TelSmith equipment can be pushed to top speed and will produce. TelSmith Engineers' plant planning is sound. TelSmith Service is fast. Get Bulletin G-34. G-10R

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## Historical Parkway For Northern Ohio

**Counties and Cities Want  
The Anthony Wayne Parkway  
Completed from Toledo to  
Fort Wayne, South to Ohio R.**

† THERE is a growing consciousness that we have neglected the past history of this country in not making it a part of the everyday thought of both citizen and tourist. An example of a good start which is now being discussed for further construction after the war is the historic Anthony Wayne Parkway in the Maumee Valley of northern Ohio. Closely tied to the early history of this nation through the gallant victories of Anthony Wayne, "the chief who never slept", this is the section of the country where "Mad" Anthony's exploits defeated the tribes of the Indian confederacy and forced the British to give up the forts they held in the Great Lakes region.

This year marks the 150th anniversary of the campaign of General Wayne and next January is the 200th anniversary of his birth. Had we been at peace, large pageants and celebrations would have taken place in this section of the country, in honor of these events, but the exigencies of war production to maintain liberty throughout the world will retard the extent of such affairs. However, with planning for future construction of highways very much to the fore and with increasing thought and consideration being given to preserving points of historic interest through markers and parks, the project of the Anthony Wayne Memorial Association to extend the Anthony Wayne Parkway to include the entire chain of cities, forts and camp grounds of the great campaign of General Wayne from Cincinnati north to Defiance and thence east and west to Toledo and Fort Wayne has greater chance of fruition.

For nearly fifteen years, the communities along the Wayne military route in western Ohio and along the Maumee River, with the cooperation of several state agencies, have been at work on sections of the Anthony Wayne Memorial Parkway. This historic, scenic and useful memorial would link the chain of forts across western Ohio and follow the picturesque Maumee River from Fort Defiance east to Toledo and west to Fort Wayne. An extension is planned from Toledo to Detroit along the shore of Lake Erie and another following St. Marys River on Wayne's route southeast from Fort Wayne via Fort St. Marys

to Fort Greenville.

Already monumental bridges, such as that at Napoleon, Ohio, mark the route which follows existing state highways for a large part of its length, requiring acquisition of more right-of-way on the opposite sides of some bodies of water where the scenic values would be greatly enhanced. It is planned that the right-of-way would vary from 300 to 1,000 feet, depending on the scenic and historic values. It would serve a vast volume of local traffic en route, but that is only a small portion of its intrinsic value to the communities, the state and the nation, for the historic values are national and the scenic values are for all who would enjoy them.

An interesting example of the thought and appreciation of scenic values as shown by the Ohio Department of Highways is found on the shore of the Maumee River. The old highway ran through a very scenic spot on the shore of the river, which at that point is really a lake, due to a dam a few miles downstream. When the highway was im-

proved, the roadway was taken several hundred feet from the shore, which would have denied the public access to the water and beautiful river vistas, and the old highway would have reverted to the original owner in accordance with the method of right-of-way acquisition in Ohio. Instead of abandoning these values, the state retained the old road as a part of the highway, and land between the old and new roads was acquired for a wayside picnic park. Thus a scenic outlook was saved for the traveler and through traffic is given better service.

### Synthetic Rubber Improved for Tires

The development of an improved general-purpose synthetic rubber of the butadiene type, which it is said will help to solve some of the serious problems involved in the manufacture of heavy-duty tires, has been announced by the B. F. Goodrich Co., Akron, Ohio. Tires made of the new material, it is stated,

show less tendency to tread cracking and greater resistance to road wear, two deficiencies which have heretofore been encountered in making large heavy-duty tires of synthetic rubber.

It is further stated that this newly-developed substitute possesses increased adhesive properties during processing, which facilitates handling, and that it requires a shorter time to prepare for product manufacture, an important consideration in meeting urgent war and essential civilian requirements. Although the fundamental development work has already been done, it is expected that it will be some time before the new material will be available for heavy-duty tires in civilian use, and the maximum conservation of tires now in service is urged.

A lack of motor-vehicle repair services and the need for more frequent check-ups are indicated in a recent report which showed an increase of 33 per cent in motor-vehicle breakdowns in the Holland Tunnel, New York City.

## "..not one single shut-down with RING-FREE"



Quoting the WILMINGTON COAL MINING CORP., Morris, Illinois: "...through dust, sand and mud in all sorts of weather, operating 24 hours a day in 3 shifts—we have not had one single shut-down as a result of stuck rings or valves, since we adopted RING-FREE. We have proven in this extremely difficult operation that RING-FREE'S ability to penetrate rapidly to tightly fitted valve stems and rings and to resist high temperatures, as well as the sludging effect generally caused by cold weather work, places it far above any lubricant we have had before."

Strippers and other motorized equipment (gasoline and Diesel) give performance you're proud of when lubricated with Macmillan RING-FREE Motor Oil. They deliver more usable power—dependable power—under toughest operating conditions because RING-FREE reduces friction fast!

And Macmillan RING-FREE removes carbon while your engine runs! Changing to RING-FREE means getting a motor that has to run sweeter as it benefits fully from rapid, thorough penetration. You get high film strength, high heat resistance and long cling from RING-FREE.

Macmillan representatives welcome your trial and comparison of RING-FREE on the basis of complete records of operating performance and economy!

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Beebe Bros. All-Steel Hand Hoists carry the highest resale value of any piece of equipment in the world. If you have one not in use, sell it. Many more than are available are urgently needed in the win-the-war program. Thanks.

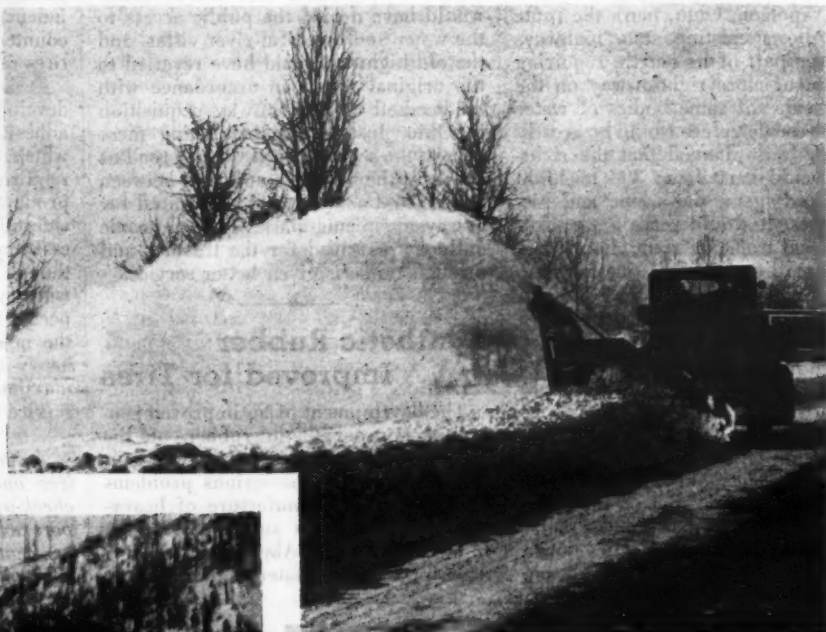
**BEEBE BROS.**  
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**WINTER** maintenance is devoted chiefly to snow removal. A Motoblade clears U. S. 10 in front of the Montana Highway Department Building in Missoula.

BUY WAR BONDS

**SPRING** brings frost-boil problems, particularly in the western part of the state, which sometimes, depending on weather conditions, makes it necessary to close some roads temporarily until corrective measures can be taken.



## Montana Na

Winter, Spring, Summer  
State Maintenance Forces  
Snow Plowing, Patching, Sealing  
And Mowing to Keep Them

**SUMMER** maintenance includes the preparation and stockpiling of crushed gravel for base and surface aggregates. Below, one of the three Cedarapids plants operated by the Montana maintenance department. Right, a Master loader mounted on a Caterpillar Thirty transferring cover material from a stockpile to a Highway Department dump truck.



**SEALING.** Above, shooting MC-3 asphalt cut-back seal on U. S. Highway No. 2 about 4 miles east of Nashua, Montana. Right, applying the cover of 1/4-inch crushed gravel by means of a wide mechanical spreader.



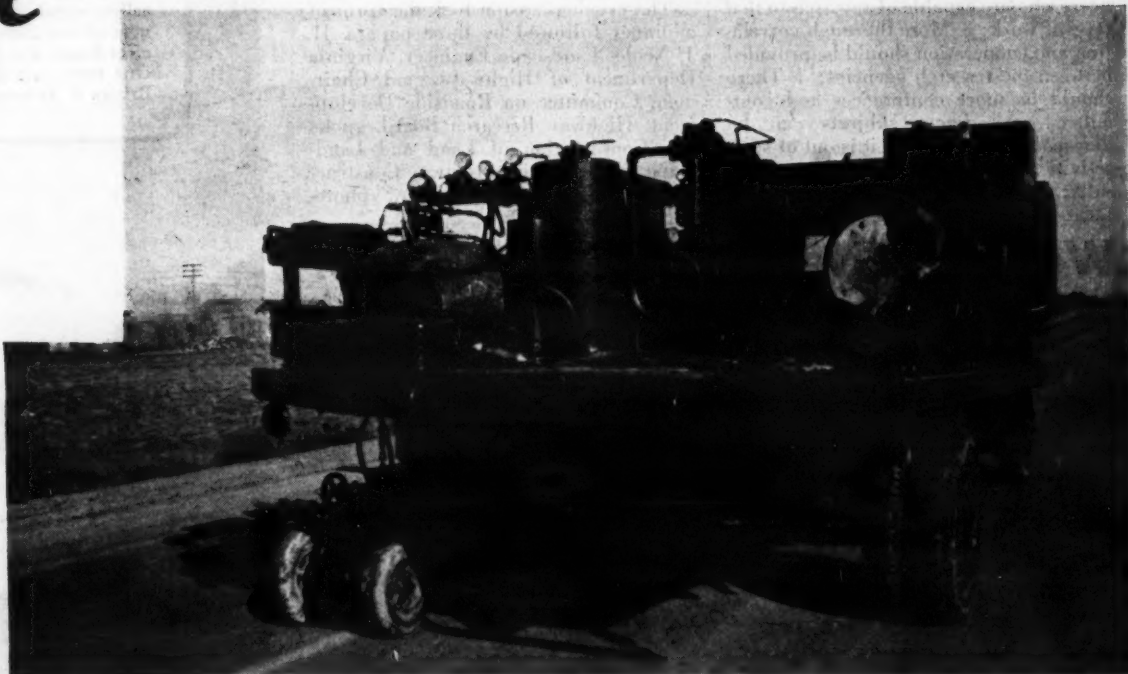




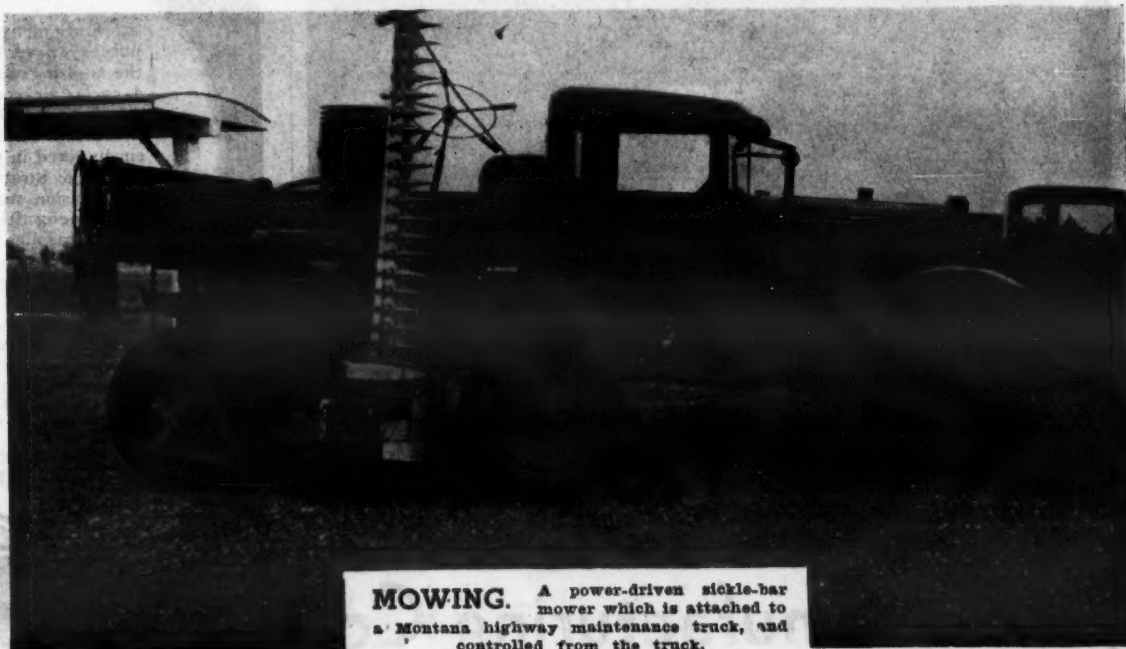
**PATCHING.** A single-roll portable roller used by Montana maintenance crews for highway repair operations.

# Maintenance

g. Summer and Autumn.  
Maintenance Forces Are Active:  
Patching, Sealing, Striping,  
to Keep Traffic Moving



**STRIPING.** As a wartime conservation measure, traffic striping has been greatly curtailed in Montana but is continued in important localities. A broken center stripe of 33 feet of paint with 66-foot gaps is standard, with a solid line where passing is not permitted. One of Montana's stripers is shown above.



**MOWING.** A power-driven sickle-bar mower which is attached to a Montana highway maintenance truck, and controlled from the truck.



## Place of Roadsides In Complete Highway

(Continued from page 19)

White urged the construction of cooperative parks at the entrance to cities as memorials to the veterans of World War II. These parks would be built as joint projects of the state and city and would be maintained perpetually by the community. He also called attention to the possibility that the present war may not be the last and that this country might be attacked from the air at some time in the future. Plans for precautionary camouflage by proper planting of trees to break the all-too-visible highway from air attack should be considered now, and not twenty years from now when the protection might be needed.

The theme of the afternoon session was "The Complete Highway as It Concerns the Engineer and the Landscape Architect". Roy W. Crum, Director, Highway Research Board, spoke on "The Importance of Highway Research in Wartime", making five special points: 1. More men should be trained now as research technologists in graduate schools; 2. There should be more research in the highway field through assigning state highway department engineers who are capable of research to that type of work; 3. More thorough correlation and cooperation should be provided between the research agencies; 4. There should be more conferences and committee work where subjects can be thoroughly discussed, as it is out of such activities that the best research work results; 5. There should be more transla-

tion of research into practical terms and means provided to disseminate it. At present, there is a tendency to a too tardy use of the results of research. This has been partially overcome in the highway field during this World War by the publication of a series of pamphlets by the Highway Research Board on the practical applications of research in stabilization, concrete curing, asphalt paving, etc. Pamphlets of this type should be continued in the years after the war in order to shorten the period between research and practical application.

"Roadside Improvement from the Freeway Standpoint" was the topic of Norman M. Wilkie, Engineer of Design, Cleveland Regional Planning Office, Ohio Department of Highways. Mr. Wilkie presented the problems in the construction of the new freeways through the Cleveland metropolitan district.

The closing paper of the afternoon session was presented by D. J. Belcher, Research Engineer, Purdue Engineering Experiment Station, Purdue University, Lafayette, Ind., "Identifying Land Forms and Soils by Aerial Photographs". Mr. Belcher showed a large number of aerial photographs characteristic of different types of soil, rock formations, erosion, and tree growth, and also presented evidence that the results of this research is being used by our armed forces outside the United States.

The evening session took the form of a dinner followed by three papers. H. J. Neale, Landscape Engineer, Virginia Department of Highways, and Chairman, Committee on Roadside Development, Highway Research Board, spoke on "Conservation of Land and Landscape Values During Highway Construction", presenting a series of photo-

graphs from all over the United States, showing both good and poor examples of conservation. "The Public Relations Value of Roadside Development" was the subject of a paper by Theodore Reed Kendall, Editor, CONTRACTORS AND ENGINEERS MONTHLY, in which an appeal was made to keep roadside parks to the minimum size for the sake of economy and the thought was presented that interstate roadside parks might be developed at state lines with the two states combining attractively landscaped park areas and information booth facilities on either side of an interregional highway to furnish "gateways of good will" for traffic in each direction. "Roadsides of Connecticut and Their Maintenance" was the subject presented by John L. Wright, Landscape Engineer, Connecticut State Highway Department, and Chairman, Committee on Roadside Development, American Association of State Highway Officials. Mr. Wright spoke of the organization of the Roadside Development Bureau and its manifold activities as well as new methods

which have been developed to increase the economy of roadside development in Connecticut.

The Saturday morning session, which concluded the Short Course, had the theme "An Educational Program for the Complete Highway". Honorable Paul M. Herbert, Lieutenant Governor, State of Ohio, and Chairman, Ohio Post-War Planning Commission, discussed "State Parks and Parkways and the Post-War Program". In his capacity as Chairman of the Ohio Post-War Planning Commission, Mr. Herbert spoke of the many industrial as well as highway problems which confront Ohio in planning for the future. Wilbur H. Simonson, Senior Landscape Architect, Public Roads Administration, spoke on "The Complete Highway" and the education of highway engineers as well as the public in looking upon the highway as a complete unit rather than considering only one individual part.

Frank H. Brant, Landscape Engineer, North Carolina State Highway and Pub-

(Concluded on next page)

## We Could Never Rate as a Guest on a Quiz Program

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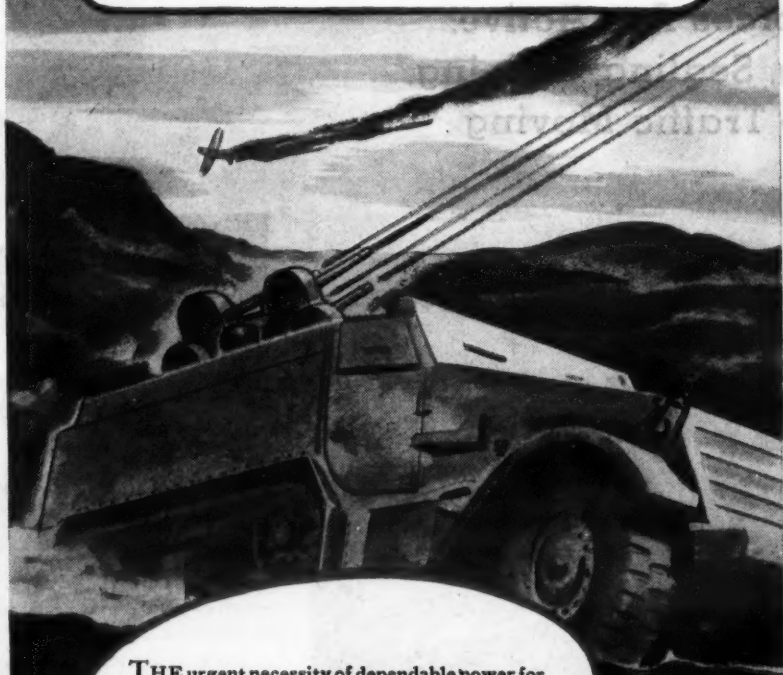
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### WHEN SPLIT SECONDS Count!

To smash strafing planes coming in fast from any angle, self-powered multiple mounted machine guns enable gunners to concentrate on hitting the targets, while speedily and effortlessly the guns are swung around, raised or lowered. One more service stripe for the hundreds of thousands of Briggs & Stratton engines now with our armed forces.



THE urgent necessity of dependable power for purposes never before imagined, have revealed the amazing versatility of Briggs & Stratton 4-cycle, air-cooled gasoline engines. Their stamina, rugged dependability and superior performance under circumstances rarely encountered in peacetime, have demonstrated Briggs & Stratton high standards of quality in precision manufacture, and substantiated their recognition as "the world's finest air-cooled gasoline engines."

Our years of experience in design and production of air-cooled engines is again available to you on present problems or in your planning for postwar gasoline engine requirements.

"It's powered right—when it's powered by Briggs & Stratton."

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BACK THE INVASION  
BUY WAR BONDS

4  
CYCLE

GASOLINE  
ENGINES







At the Dinner Meeting of the Fourth Annual Short Course on Roadside Development at Ohio State University in March. In the usual order, W. V. Buck, Senior Landscape Engineer, Public Roads Administration, Columbus; John Floyd, Ohio Department of Highways, Ravenna; and Fred Swineford, Priorities Engineer; W. M. Moore, Division Engineer, Div. 4; Hayden French, Construction Engineer, Div. 12; Robert E. Willems, Division Engineer, Div. 12; Glen E. Logue, Chief Engineer and Assistant Director; and Robert McKee, Engineer, Bureau of Location and Right-of-Way, all of the Ohio Department of Highways.

## Roadside Development Short Course in Ohio

(Continued from preceding page)

lic Works Commission, spoke on "Co-operative and Coordinated Educational Programs", featuring "The Clearing House", a unique publication with a very limited circulation among landscape supervisors and engineers of state highway departments to which the subscribers contribute their own experiences in the form of short articles, letters and reprints. This publication, an effort of the Roadside Development Committee of the Highway Research Board, is a helpful medium of exchange for technical data and experience in the field.

Two Division Landscape Architects of the Ohio Department of Highways, Wilbur J. Garmhausen and Charles S. Ross of Chillicothe and Ashland, Ohio, respectively, presented their own independent views of the proper educational qualifications which a landscape architect should have to engage in roadside-development work for a state highway department. Professor Charles R. Sutton, Department of Landscape Architecture, Ohio State University, spoke on the needed flexibility of courses in landscape architecture to permit students to secure the most beneficial training to enter the field of roadside development as a landscape architect for a state highway department. The session was closed by a summary discussion by George B. Gordon, Associate Landscape Architect, Public Roads Administration, which was a fitting tribute to the Short Course and to the achievements of landscape architects, engineers, and supervisors in the work they have been doing to improve roadsides, reduce erosion, and cut the cost of maintenance.

Great credit is due to Dallas D. Dupre, Jr., Landscape Architect, Ohio Department of Highways, and Professor Charles R. Sutton, Department of Landscape Architecture, Ohio State University, who have organized all four of the Short Courses which have been held at the University in this and the three previous years. While many state universities or highway departments hold highway conferences annually, the Ohio Short Course on Roadside Development is the only one of its kind in the country and has done much to integrate roadside development with the features of location, design, construction, and maintenance of modern highways.

### Cheney Promotion Mgr. For Macmillan Petroleum

Anticipating highly competitive post-war marketing of petroleum products, the Macmillan Petroleum Corp., Los Angeles, Calif., has appointed Howard W. Cheney as Assistant to the President to direct advertising and promotion, with particular emphasis on the sale of

Ring-Free motor oil. Mr. Cheney has served as an advertising agency account executive, directing merchandising and sales promotion for oil and aviation

firms. After a three months' national tour of visits to Macmillan district offices and distributors, he will make his headquarters at the company's main office, 530 Sixth St., Los Angeles.

### Small Earth-Moving Unit For Wide Range of Jobs

State and county engineers and contractors will be interested in a brochure just released by R. G. LeTourneau, Inc., Peoria, Ill., describing the Model D Tournapull. This small earth-moving unit which was originally designed to meet the Army's need for a piece of equipment which would fit in a transport plane, has proved to be equally useful for civilian construction, as shown in the brochure's illustrations of the Model D at work on different types of earth-handling jobs. In addition to the descriptive text and illustrations, the brochure includes specifications lists and other D Tournapull data.

Copies of the brochure may be secured direct from LeTourneau.

## OK PORTABLE ELEVATORS



For Quick and Economical Hoisting of Bricks, Concrete & Other Materials—

FOR EASE AND SPEED IN ASSEMBLING AND DISASSEMBLING—

FOR EASE IN MOVING TO THE NEXT JOB—

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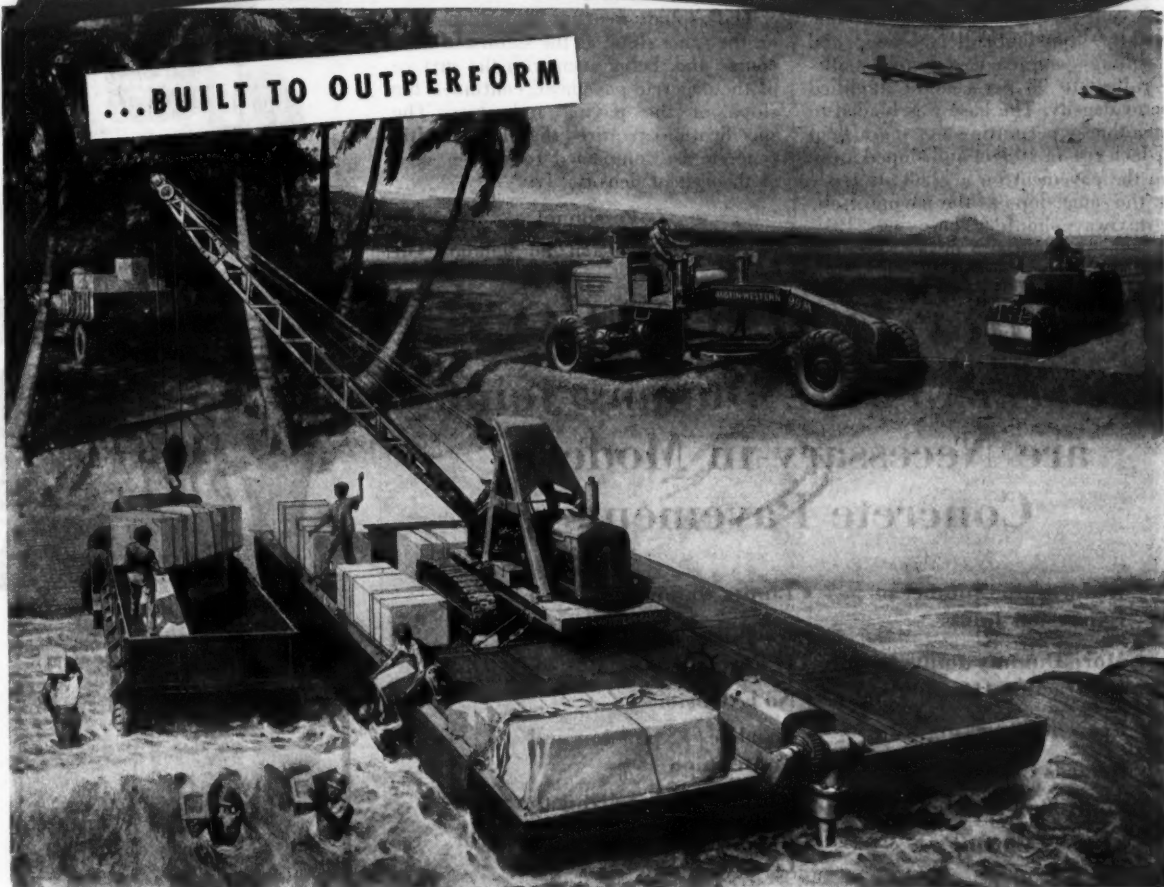
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AUSTIN-WESTERN COMPANY, AURORA, ILLINOIS, U.S.A.



BUY MORE WAR BONDS



## Asphalt Shoulders For Airport Paving

**Both Runways and Taxiways Have Shoulders of Hot-Mix Top on Stabilized Base at Maxwell Field, Alabama**

AS great care has been taken in the protection of aircraft which might run short distances on the shoulders of runways and taxiways at Maxwell Field near Montgomery, Ala., as was taken to insure smoothness of the concrete pavement. The 150-foot concrete runways (See C. & E. M., Feb. 1944, pg. 2) have a 75-foot asphalt shoulder at either side except for the last 300 feet at the ends, where concrete is used throughout. The taxiways are 100 feet wide with 12½-foot shoulders consisting of a stabilized base of clay-gravel 12 inches thick with a tar prime of 0.3 gallon per square yard.

### Stabilized Base

All shoulders are supported adequately on a stabilized base of clay gravel 12 inches thick laid down in three equal courses. Each course was compacted by sheepfoot rollers, bladed, and the rolling completed with pneumatic-tire rollers to 95 per cent of modified Proctor density. The base was bladed to a smoothness permitting not more than a ¼-inch rise in 10 feet and sloped away from the pavement on a grade of 1 per cent, the same slope as the paving itself. The taxiway shoulder base was 12½ feet wide, while the runway shoulder

base was 80 feet wide for the 75-foot hot-mix top.

### Bituminous-Concrete Paving

The compacted base for the runway shoulder was primed to waterproof it with 0.3 gallon of RT-3 per square yard, shot in 20-foot widths for a width of 76 feet, and then sealed 75 feet wide with the hot-mix top.

The bituminous-concrete wearing course was supplied by a commercial plant in Montgomery and was laid 1½ inches thick, compacted by an Adnun spreader in 10-foot strips. The crew for operating the asphalt spreader consisted of one man on the screed, one man dampening the rollers of the machine, two men cleaning the trucks, two rakers, and two men carrying asphalt back to the rakers as needed. Compaction was secured by rolling first with a Galion 7-ton tandem roller followed by a 10-ton Buffalo-Springfield roller.

The specifications for the asphaltic concrete required 5 to 8 per cent of AC-12, which has a penetration of 120 to 150. The gradation of the aggregates had the following limits:

Passing ¾-inch	100 per cent
Passing ½-inch	76-90 per cent
Passing No. 4	48-62 per cent
Passing No. 10	39-49 per cent
Passing No. 40	23-35 per cent
Passing No. 80	15-25 per cent
Passing No. 200*	4-8 per cent

\*Both stone dust and cement were used for the No. 200 material.

The asphalt wearing course was laid on the same slope as the stabilized base course and, being even with the surface of the concrete pavement, continued the slope of the paving unbroken. The specifications required that the asphaltic concrete be compacted to 95 per cent of theoretical density.

### Personnel

The aggregates and the Standard Oil

of Louisiana asphalt were mixed in a Warren Brothers 1-ton asphalt plant, owned by Hodgson Concrete & Asphalt Co., of Montgomery, Ala. The base course and prime were also done under contract by E. J. & W. L. Cobb Construction Co., of Montgomery, Ala.

The work was under the direction of the Mobile District, U. S. Engineer Department, with Major A. D. Dukes, Area Engineer, in charge. Capt. H. L. Fuller was Assistant Area Engineer.

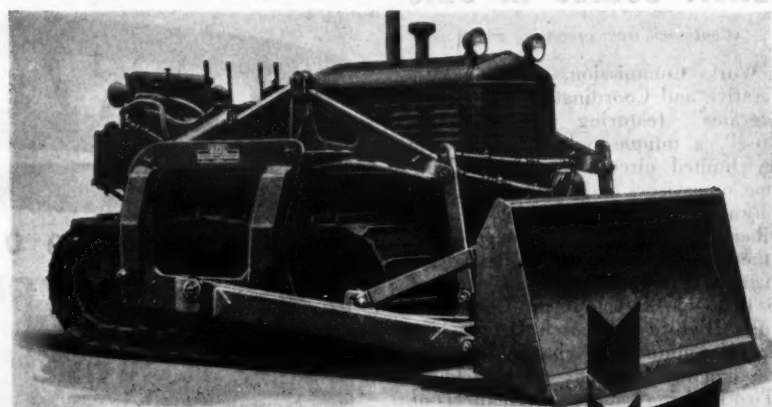
## Plant-Mix Project Awards in Kentucky

A feature of the annual meeting of the Plantmix Asphalt Industry of Kentucky, held March 9-10, 1944, in Frankfort, Ky., was the presentation of four awards for the best plant-mix jobs completed by contractors in Kentucky in 1943.

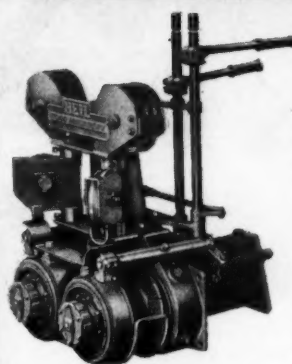
The first award, for the best constructed plant-mix asphalt city street in Kentucky during the year 1943, was pre-

sented to the Highland Construction Co., Louisville, Ky., represented by W. W. Schmidt. The second award, for the best constructed plant-mix asphalt highway on the Federal road system for 1943, went to the Kentucky-Virginia Stone Co., Middlesboro, Ky., represented by W. B. Paynter. The third award, for the best constructed plant-mix asphalt maintenance resurfacing project in Kentucky in 1943, was presented to the Portsmouth Asphalt Co., Portsmouth, Ohio, represented by Floyd C. Fuller. The fourth award, for the largest 8-hour tonnage of plant-mix asphalt made and laid in Kentucky in 1943, 1,086 tons, was made to the Allen-Codell Co., of Winchester, Ky.

The Committee of Awards was composed of John A. Bitterman, Chief of Laboratory, Kentucky Department of Highways, L. J. Bryant of the Laboratory, Thomas H. Cutler, State Highway Engineer, D. H. Bray, Director of Maintenance, and G. L. Logan, Director of Construction, all of the Kentucky Department of Highways.



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**Down Pressure**  
is required...



### Dependable Power Control Units for All Makes of Tractors

Smooth-operating brake and clutch assemblies eliminate shocks and jerks; the large drums run cool; the sheaves are designed to reduce wear on cables. Fingertip control gives lightning-fast response for bigger yardage. They're designed for use with cable scrapers or other cable-operated equipment on all makes of tractors.

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## Heil Bulldozers handle the toughest assignments with ease

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This widely-used Heil Bulldozer is designed to work integrally with Cletrac tractors with no unusual or severe twists or strains on the tractor at any point. Balanced loads, backed by full length crawler drive, result in effective digging and dirt-moving performance, plus big savings in maintenance cost on both blade equipment and tractor. Enjoy maximum work and satisfaction with a Heil Bulldozer... designed and engineered to move "pay dirt" quickly, easily and economically.

R-28

SEE YOUR CLETRAC  
TRACTOR DISTRIBUTOR

## Twenty-two REASONS Why FLEX-PLANE Dummy Joints are Necessary in Modern Concrete Pavements

- Reduces the Number of Expansion Joints
- More Dummy Joints Divide Contraction Openings
- Prevents Cracking
- Retards Creeping
- Controls Warping
- Reduces Curling
- Relieves Stress
- Lessens Bumps
- Minimizes Pumping
- Minimizes Panning
- Lessens Deterioration
- Lowest Cost
- Limits Maintenance Cost
- Anchored in Place—Is Permanent
- No Extrusion
- Localizes Expansion and Contraction
- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
- Increases Strength of Slabs
- Produces Homogenous Structure
- Provides Expansion Relief for the Hot Upper Part of the Slab



**FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints... ribbon, poured, pre-moulded, etc., with or without VIBRATION.**

• Ask for Equipment Specifications •

**FLEXIBLE ROAD JOINT MACHINE CO.** WARREN, OHIO



GENERAL OFFICES

MILWAUKEE 1, WISCONSIN





Charles M. Upham, Engineer-Director, American Road Builders' Association, receives the plaque presented by the Michigan Road Builders' Association in recognition of his contributions to highway progress and in post-war highway planning. The award was presented to Mr. Upham by Congressman Jesse P. Wolcott of Michigan, at right, a member of the House Roads Committee, and a featured speaker at the Annual Meeting of the Michigan Road Builders' Association in Detroit, April 3. In the background is Jarvey Campbell, Executive Vice President of the Detroit Board of Commerce.

### New Booklet Discusses Projective Maintenance

In an article on page 34 of the March issue of CONTRACTORS AND ENGINEERS MONTHLY, a new approach to the problem of highway maintenance, termed "Projective Maintenance" by H. D. Metcalf, Chief Engineer of Maintenance, Ohio Department of Highways, was discussed. This new type of maintenance is designed to be long lasting, rather than sustaining, and to fit into the complete highway program.

A new booklet recently issued by the

Calcium Chloride Association is devoted to this subject of projective maintenance, and points out how calcium chloride can be used in maintenance operations from the subsoil to the surface to secure lasting benefits. For example, post-hole treatment of frost-heaving areas is proposed as a corrective treatment for subgrades; the addition of stabilized aggregates is advocated for the strengthening of base courses; surface materials can be conserved through the addition of binder soil and calcium chloride; and the widening of paved roads which are too narrow for in-

creased traffic loads calls for stabilized shoulders. The last part of the bulletin deals with expediting patching of concrete pavements by the use of calcium chloride in concrete mixes, for earlier strength and reopening.

Copies of this bulletin "Projective Maintenance" will be sent to any interested highway official or engineer on request to the Calcium Chloride Association, 4145 Penobscot Bldg., Detroit 26, Mich., and mention of this item.

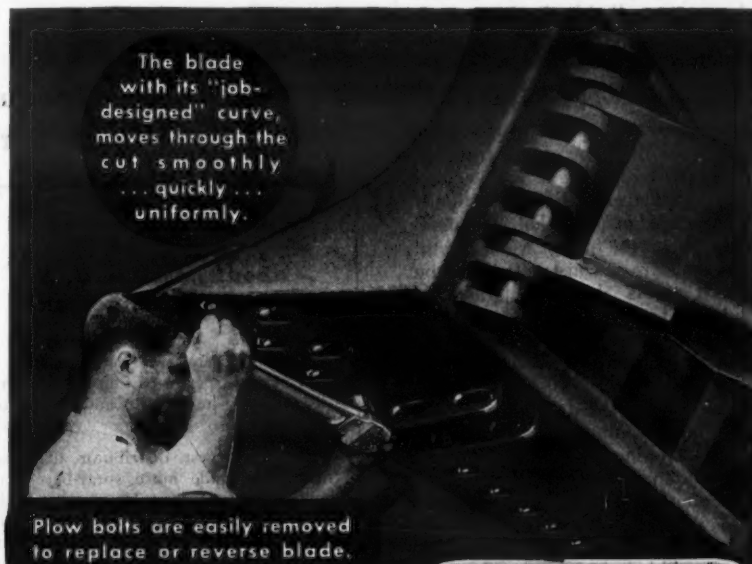
### System of Highways Planned for India

A network of 400,000 miles of roads, approximately one-half hard-surfaced, adequately to coordinate provincial, district and village roads, was advocated at a recent conference of engineers from the Provinces and States in India. The engineers recommended the immediate creation of a road board with authority to direct highway development and to ask for highway legislation for all parts of India.

### Caterpillar Asst. Treas. Resigns; Joins Dealer

Announcement has just been made of the resignation of Thad Eaton as Assistant Treasurer of the Caterpillar Tractor Co., Peoria, Ill. Mr. Eaton plans to form a partnership with John Perkins, Caterpillar distributor for Boston and vicinity, the new organization to be known as the Perkins-Eaton Machinery Co. It will continue to operate in the same territory as that formerly served by P. I. Perkins Co. Beginning as Assistant Credit Manager for the Middle West territory in 1928, Mr. Eaton has served the Caterpillar organization as Assistant Credit Manager for Export, Manager of the Export section, and in 1940 was appointed Assistant Treasurer.

Mr. Eaton will be succeeded as Assistant Treasurer by Virgil V. Grant, who joined the Caterpillar organization in 1936. At the beginning of the war he was given the position of Supervisor in the Auditing Department where he remained until his present appointment.



Plow bolts are easily removed to replace or reverse blade.

You get more drive... more penetrating power at the blade—with HEIL



## Cable Dozers

Move more "pay dirt" with each load — quickly — economically

Doing a clean-cut job — cutting at just the depth desired — cutting accurately and smoothly with no wash-board or gouged grade — these are features of Heil Cable-Dozer performance. End-tilt adjustments are easily and quickly made — angling the blade merely involves the removal of a pin in the side member, adjusting blade, and replacement of pin.

Heil Cable Dozers are engineered throughout for "tops" in performance and "savings" in your pocketbook. You're money ahead when you specify Heil Cable Dozers.

R-27

Write for bulletins.

SEE YOUR INTERNATIONAL TRACTOR DEALER



Definite "plus" features are responsible for the "plus" performance of Heil Cable Scrapers

In improving scraper performance, Heil engineers developed fundamental design changes, such as scientifically located draft pivot point—tilting floor push-out—contoured bowl design—all-welded box sections — etc. These improvements add up to bigger yardage at lower cost—and earn a reputation for "on-time" performance. Write for bulletins.



THE HEIL CO.

GENERAL OFFICES

MILWAUKEE 1, WISCONSIN



THE "Brass Brain" (FLUIDOMETER)

This automatic metering system saves time, materials — insures uniformity. For all types of plants.

### H & B PLANT SPEEDS ROAD CONSTRUCTION AT BIG NAVAL TRAINING STATION

With this Hetherington & Berner plant, Dale Engineering Co. (Utica, Syracuse and Rochester, N. Y.) averaged 100 tons of tar concrete per hour—every hour—on a road construction job at the big Naval Training Station at Sampson, New York. When the work day was lengthened from 10 to 12 hours, the daily production was boosted to 1,300 tons. Four black top paving machines were kept busy handling the output of this one plant.

This production is typical of the way in which H & B plants are helping speed the construction and maintenance of roads and bases that are vital to Victory. Write for complete information on H & B portable and stationary asphalt plants.

HETHERINGTON & BERNER Inc.  
INDIANAPOLIS • INDIANA

Hetherington & Berner





The new Buckeye bulldozer.

### A Pivoted Bulldozer With Cable Controls

A new cable-controlled bulldozer and trailbuilder with center-lift construction of the moldboard has been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio. This new Centro-Lif unit is offered in two models, one weighing 5,855 pounds without the power control unit, for Allis-Chalmers HD-14 tractors, and the other weighing 5,140 pounds without the power control unit, for Allis-Chalmers HD-10-W tractors. Both models are controlled by Buckeye single or double-drum power control units. The bulldozer is engine-mounted and the cable is carried overhead from the wipch to the moldboard.

The manufacturer points out several advantages for this type of construction, including the light weight for its size, simplicity, and straight lift of the blade. The unit is designed so that the moldboard is close to the tractor radiator and the push arms are so constructed that the moldboard pivots about a single king pin and can be angled to the right or left simply by removing two side pins, swinging the moldboard to the desired side, and replacing the pins. The moldboard can also be tilted by means of a double-trunnion mounting of the push arms. By attaching one push arm to the top trunnion on one side while the other arm is mounted on the lower trunnion on the opposite side, a vertical adjustment of 12 inches at the end of the moldboard is possible.

The maximum height of lift of the leading corner of the blade is 53 inches, while the digging depth of the blade below grade is also large. The trailbuilder moldboard is 12 feet 9 5/8 inches long and 37 9/16 inches high and is fitted with a reversible cutting edge and replaceable corner bits.

Complete information regarding this new unit may be secured direct from the manufacturer by mentioning this descriptive text.

### New Types Added To Electrode Line

Four recent additions to the Perfection line of welding electrodes have been announced by the Anthony Carlin Co., 2717 East 75th St., Cleveland, Ohio. Grade P-61 is especially designed for fast production where high currents are used and the arc action is strong. It is a shielded-arc general-purpose straight-polarity dc electrode, suitable for welding mild steel in all positions, and meets the requirements of A.W.S. Classification E6012. P-103 is a shielded-arc ac electrode, for all-position welding, constructed in accordance with A.W.S. Classification E6011 and A.S.M.E. Par U-68. It may also be used for welding the low-alloy high-strength steels when these steels are used primarily for their high-strength properties. P-170 and P-180 are straight-polarity dc bare and wash-coated electrodes, meeting the requirements of A.W.S. Classifications E4510 and E4511 respectively, and are applicable in a wide range of operations wherever the physical properties indicated in the specifications are acceptable.

A recently revised catalog containing further information may be secured by writing direct to the manufacturer and mentioning this item.

### Build by Contract; Study Shows It Pays

(Continued from page 14)

amount it will cost and whether it meets his available funds or estimates. This definite price is guaranteed by a surety bond.

2. The results of the investigation of cost by the Public Roads Administration is proof that the contract system is the more economical way to handle public works.

3. The experience of industry and of the public as owner or purchaser has been that work done by the contract system has been completed in one-third to one-half of the time required by any force-account method.

4. The quality of the work is guaranteed to the public or the owner because of the rigid inspection exercised by the owner under the contract system. Plans and specifications are prepared on which bids are received and a standard established which is guaranteed under the

contract system.

5. The contract system, which operates under rigid specifications, tends to standardize and improve methods of construction throughout the country. It is generally known that much force-account work is done without adequate plans and specifications and, when they are available, they are seldom strictly followed.

Buy War Bonds regularly!

Write For Details



### A TOUGH ROLLER FOR TOUGH JOBS

Pierce-Bear 2-5 Tons Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Narrow rear roller gives heavy-duty compression. Built-in water tanks for wet rolling. Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine.

Manufactured by

H. W. LEWIS EQUIPMENT COMPANY

431 Madison Avenue  
SAN ANTONIO 3, TEXAS  
Phone: Garfield 6137

## ETNYRE U. S. PATENTED SPRAY-BAR

Attains Unequalled Efficiency in Application of Asphalt Cut-Backs, Tar, Road-Oils, Emulsion . . . In "Black-Topping"

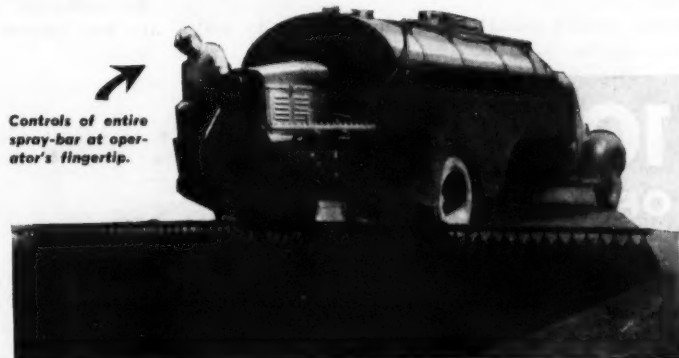
### NOTICE about possible U. S. Patent infringement

At intervals, some "new" spray-bar is presented. Claims are made of how it will improve performance of an owner's distributor if he will buy and put one on his machine.

Etnyre, largest distributor manufacturer, has made more spray-bars than any other producer. Thousands are in use, having applied actually BILLIONS of gallons of asphalt, cut-backs, tar, road-oils and emulsion in YEARS of black-topping service.

Etnyre "Black-Topper" equipment is protected by U. S. Patents with other patents pending.

- Sprays Any Width . . . up to 24 Feet or Wider
- Instant Start or Shut-Off at Every Nozzle



Controls of entire spray-bar at operator's fingertip.

### FULL CIRCULATION IN BAR . . . NO "FROZEN" ENDS . . . NO CONGEALED LIQUID

#### Replace Obsolete Spray-Bar On Your Distributor Now

Now is the time you should "modernize" your distributor—bring it up-to-date with an Etnyre Pat'd shut-off-at-nozzles spray-bar . . . and thus be ready to meet the rigid black topping specifications of Highway Engineers.

It is significant that U. S. Army Engineers, checking ALL makes of distributors and ALL makes of spray-bars chose the Etnyre. In doing this they substantiated the judgment of thousands of road-contractors and Highway Engineers.

Etnyre pat'd spray-bar on YOUR distributor will pay for itself in a short time by better performance; faster and greater output.

Get in touch with your Etnyre dealer . . . or with us. Give full facts . . . model, year and size of your distributor.

The reason why the Etnyre "Black-Topper" is the most widely-used of all bituminous distributors is that it is the distributor which correctly coordinates FOUR FUNCTIONS SIMULTANEOUSLY—

1. Heats liquid to proper temperature; maintains it.
2. Pumps liquid from tank through circulating system to spray-bar.
3. Circulates liquid to and through the spray-bar.
4. Sprays liquid with precise accuracy and uniformity which may be varied from 1/10th gal. to 3 gals. per square yard . . . in widths to 24 feet, on flat surfaces, grades, and crowns.

This liquid may be asphalt, cut-back, tar, road-oil or emulsion . . . from the heaviest to the lightest. It must penetrate, under proper pressure, into heavy aggregates . . . or a lighter application on gravel . . . or a finishing "seal coat." Each square yard applied with utmost uniformity . . . and each yard completely accurate as to amount.

Etnyre Pat'd spray-bars . . . as used by U. S. Engineers on hundreds of Etnyre "Black-Toppers" now in war service . . . make possible this performance, unequalled by any other distributor, or by any other spray-bar.

On the Etnyre pat'd "shut-off-at-nozzles" spray-bar each nozzle may be stopped or started instantly . . . as many nozzles as desired may be used . . . any place along bar . . . to spray any width . . . any part of the surface. No bar need be removed. Ends fold up for transit. Get facts now from your Etnyre dealer or write directly to us. Get faster, better "black-topping" with an Etnyre.

## ETNYRE "Black-Toppers"

The most-widely-used bituminous-materials distributors in the world

E. D. ETNYRE & CO. Founded 1898 OREGON, ILL., U. S. A. 173 Bent Street CAMBRIDGE, MASS.



## Central Garage Shops Of Indiana Hwy. Dept.

(Continued from page 2)

ment. This order has an original on orange paper which goes to the Audit Department, a yellow copy which is retained by the stock room, a second yellow copy which is delivered to the sub-district with the parts as a packing slip, and a fourth copy on blue paper which is also sent to the sub-district for acknowledgment of the receipt of the shipment and then is returned to the Central Office.

There are eight stock-room men within the locked enclosure, and no others are admitted except officials of the Department on business. The entire building is floodlighted, and the lower-floor windows are protected by metal grills. A night watchman is kept in the building when the office and shop forces are off duty.

A shipping room between the Parts Department and the Stock Clerk's office is equipped with large steel bins, one for each sub-district garage. As requisitions from the sub-district garages are filled, they are placed in these bins. Then, when a sufficient quantity is assembled, they are shipped or picked up by a sub-district truck which may be making some delivery to the Central Garage.

An inspection of the stock room brought out several interesting facts which may be helpful to other state and county units. Shovels and scoops are stored in small enclosures made of 2 x 4's stood on end, thus conserving considerable space. The Stock Department has a number of Pyrene, Lux, Foamite, and soda-and-acid fire extinguishers distributed at convenient points.

Because of the scarcity of parts, each sub-district is now required to supply an old part for each new repair part requisitioned. If it is possible to salvage the old part in the Central Shops, this is done, and the repaired part is then placed in stock. Because of the shortage of mechanics available at the wages which can be paid in the shop, bids are being taken locally for an increasing amount of equipment repair. Also, repair parts are being purchased locally from distributors because of the difficulty and delays entailed in purchasing direct from manufacturers.

In order to provide employment at the penal institutions, the State Reformatory rebuilds the rotary brooms, brushes, and street brooms used by the Highway Department. The State Prison has a complete shop for the manufacture of all paint for the Department, including both traffic and field paint.

### The Central Shops

The first floor of the Central Shops is a garage used largely for the storage of passenger cars, which includes those of all state departments in Indianapolis. The Department has frozen a large number of departmental cars, and removed the tires which have been bundled and marked for storage.

There is one main overhead door to the garage from the street, and at the right of this entrance is the lubricant-dispensing stall, while greasing is done at a booth to the left. The greasing stall on the first floor is equipped with both Alemite and Aro lubricating systems. Sawdust on the floor makes it easy to clean up spilled grease and prevents the floor from becoming greasy. A pneumatic manifold on the wall permits easy connections to the various power lubricating units.

At the left of the entrance is a section devoted to emergency repairs of a minor character and for the checking of tires.

The second floor is devoted to automotive repairs, a carpenter shop, and a

top shop, where upholstering was formerly done. Beneath a series of high windows at the front are five pairs of mechanics' benches running from the wall out into the shop. Each bench has a bank of drawers, heavy vise, and distributed along the group are a Champion spark-plug cleaner and another sand-blast-type spark-plug cleaner. Noted especially as an item showing the ingenuity of the mechanics are old axles cut and flared to use as stands for cars while work is being done on wheels and transmissions.

The carpenter shop is equipped with one large and one small buzz saw with tables. It also has a joiner, a band saw, and a heavy-duty boring unit and router, which is used for mortising.

The paint shop for equipment occupies three bays and has heavy-duty fans to draw out the paint spray when the shop is in operation.

The blacksmith shop and a welding booth are set up on this floor, with a forge, anvil, and bending block. Presto-weld acetylene welding equipment is

used, and a P & H-Hansen portable electric welder. It is interesting to note that the sole blacksmith and welder left in the shop is a Mr. Weilhammer.

To speed up the cleaning of transmissions, oil-dispensing funnels, and parts which are coated with oil and dirt, a Rex Degreaser using Perm-A-Clor vapor is set up, with gas heat beneath the bath causing the liquid to vaporize and a jacket of cold water near the top

to condense the vapor and prevent its loss. The blacksmith made a three-prong device which is placed on a broom handle to make it easy to pick up funnels, oil pots, and other parts placed in the Degreaser in bulk. When cleaning motor parts, they are placed in large wire baskets to keep the parts from one machine together.

Other equipment on the second floor (Concluded on page 70)

## EXPANSION JOINTS

For your requirements in Airport Runways, Dams, Bridges, Highways, Base Pavements and general work, *Servicised* Asphalt, Fiber, Cork and Self-Expanding Cork are recognized as a good construction practice.

Manufactured to comply with all Federal, State and Railroad Engineers Specifications.

Pioneers in the manufacture of Construction Materials for over twenty-three years.

Free Catalog on Request

**SERVICISED PRODUCTS CORPORATION**  
6051 W. 65th St. Chicago 38, Ill.

# NEGLECT CUT THE LIFE of this engine in half...



...ARE YOU

**THE** many years your Buda engine are the result of care in design, selection of skilled workmanship. Give your engine the same care in lubrication and regular maintenance, and you'll get every hour of smooth performance out of it. Start regular engine maintenance now... keep your engine on the job for Victory! Your Buda distributor will gladly help you — see him today.

*Get in the Scrap*



... don't make it!

Every engine part you save means one more for the battlefield. Take care of your engine regularly—check your instruction book for details on lubrication and service.



ORDINARY DIESELS

... High cylinder pressures produce sledge-hammer blows that punish pistons, rods and crankshaft every power stroke.



BUDA

Low-Pressure DIESELS Prolonged "low-pressure" combustion delivers a smooth, steady power stroke that cuts vibration saves parts.

# the BUDA Co.

15412 Commercial Ave., Harvey, (Chicago Suburb) Illinois



## Compressed Air Tools Developed on the Job

**A Buffer for Cleaning Bolts and Tie Rods for Re-Use, and a Router for Cleaning Filler from Between Walls And Columns. Made at Keswick**

† TWO helpful tools for special purposes have been developed on the Keswick Dam and Powerhouse job which is being built at Redding, Calif., by Atkinson Kier Co., for the Bureau of Reclamation. R. K. Fowler, Job Engineer, reports that both machines, a compressed-air buffer for cleaning threads on bolts and tie rods, and a router for cleaning out a joint-filling material placed between walls and columns to permit separate pouring, were constructed from material already on the job in the contractor's shop.

### Buffer to Clean Threads

The buffer was designed to clean the threads on shee bolts and tie rods to permit their re-use. It is constructed from 1½-inch standard iron pipe with standard couplings used at each end of the 13-inch pipe casing, to house the bearings and grease retainers. At one end a 7-inch blower case is welded to the coupling. A clearance of 1/16 inch is allowed between the blades of the blower wheel and the blower case. The blower wheel, which is fitted to one end of a 5/8 x 20-inch steel shaft, consists of a 4¼-inch hub with twelve blades measuring 1 11/16 x 13/32 x 1/8 inch. The buffer is mounted on the other end of the shaft. The air supply is fed to the blower through a ½-inch pipe and is controlled by a foot throttle, connected to a quick-acting valve. The exhaust is carried from the blower by a 1½-inch pipe to a muffler. The machine is lubricated by two Alemite fittings mounted in the pipe casing.

### Router Removes Filler

The router was designed to remove the 1-inch Fir-Tex joint-filling material which was placed between the walls and the columns of the powerhouse for convenience in pouring the two separately. The 36-inch handle of the router is made of ¾-inch pipe, reinforced by a 1/8 x 1-inch piece of strap iron. Air is fed through the handle to the cutting-wheel



Two shop-built tools which have speeded the work at Keswick Dam and Powerhouse in California. Above, a buffer for cleaning bolts and tie rods and, left, a router for removing joint-filler material between walls and columns after pouring.

housing. The cutting wheel consists of a 4-inch hub holding eight cutting teeth and revolves on a ball bearing taken

from an air pump. A clearance of 1/6 inch is allowed between the cutting teeth and the wheel housing. The entire machine is only 13/16 inch thick, permit-

ting it to be used easily in the 1-inch space between the powerhouse walls and columns.

### Save Time and Money

The experimental models of both machines have proved very successful and they have met the full requirements of the jobs for which they were designed. In the case of the router, the job has progressed with four times the speed of the original work, in which the joint filler was dug out by hand, many times as far as 3 feet back from the face of the joint. The buffer has speeded up the reclaiming of the shee bolts and tie rods many times, making much more form equipment available for re-use. Both machines have also substantially lowered the cost of the work in which they are used.

*No engineers, architects or planners, however enthusiastic, can progress faster than legislation, finance and the authorities let them.—"Roads, Power and Post War," The Surveyor (England).*

# Resurfacing



## Hydromotor Controlled



The BURCH TRUK-PATROL is not merely a scraper. It is equipped with a curved cutting blade and thus will do many different jobs and do them better. A HYDROMOTOR controlled machine, speedy, efficient, economical. Ask us for Bulletin M2.

★

THE BURCH CORPORATION  
Crestline, Ohio  
Equipment Since 1875.

★

SUPPORT THE WAR EFFORT, BUY BONDS

Asphalt resurfacing of our highways, streets and roads, now greatly in need of attention, offers many advantages. Dangerously cracked and broken pavement is restored to a safe surface. Practically no engineering time is required. Operations can be started immediately and completed within a short time.

Savings are effected through utilizing the old base, eliminating the cost of new construction. Leveling arms smooth out uneven base surfaces.

Using the Barber-Greene Tamping-Leveling Finisher, only a minimum operating crew is required.

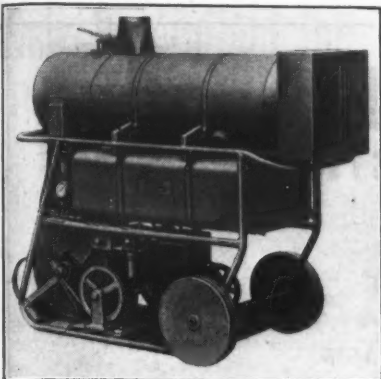
There is little traffic interruption as the Barber-Greene lays one ten to twelve foot lane at a time. Because of the tamping action, material is compacted immediately behind the machine so that rolling can progress right up to the Finisher.

For further information on the B-G Finisher and its availability now, write Barber-Greene Co., Aurora, Illinois, U. S. A.

# BARBER-GREENE

AURORA ILL.





The Janitrol portable heater without its side boards.

## Portable Unit Heater Has Big Production

A new portable multi-service heater with great heating capacity has been announced by Surface Combustion, Toledo, Ohio. Among the many services of this unit is the warming of field repair tents, temporary localized heating of warehouses and other buildings, supplying heat for concrete mixing or during curing under tarpaulins in freezing weather, thawing frozen rolling equipment treads, brake drums and radiators, in fact almost any heating job indoors and out where a large volume of warm air will meet the needs of the moment.

The new Janitrol portable heater embodies the same "whirl flame" combustion principle as its similarly named aircraft heater which Surface Combustion, in cooperation with Air Force engineers, completed and announced recently. The whirl flame combustion principle permits quick lighting in sub-zero temperatures and makes it impossible for the heater to blow out, regardless of temperature, altitude or air density, according to the manufacturer.

Equipped with either gasoline-engine or electric-motor drive, and mounted on a two-wheel carriage, the unit can be moved in wheelbarrow fashion or can be pulled sled-fashion over snow, ice or mud. Draw and push bars, as well as lift bars, are incorporated into the frame. Ease of portability is assured by the fact that the center of gravity is directly over the wheels when the unit is lifted to the most convenient position for hand wheeling.

Both engine and combustion exhaust gases pass out of one common flue, requiring only one stack. Any unburnt gas from the engine exhaust is burned in the combustion chamber, and venting the engine exhaust into the combustion air blower reduces the engine noise. The output rating of the portable Janitrol heater is 250,000 Btu per hour with a temperature rise of 230 degrees. The fuel-tank capacity is 25 gallons which is sufficient for 8-hours operation. The unit weighs 270 pounds with the tank empty and without the ducts.

Complete information may be secured direct from the manufacturer by mentioning this item.

## The Speed Problem

This is the title of a new study by the Eno Foundation for Highway Traffic Control to obtain the benefit of the practical experience of others who have studied the subject of traffic speeds from its different angles. The conclusions resulting from this study are:

1. Speed is a factor in every motor-vehicle accident.
2. Accident severity is directly proportional to speed.
3. Speed too high for conditions is one of the major causes of accidents.
4. The development of modern motor vehicles is far in advance of the majority of our highways or of the ability of our drivers.
5. Sections of highways should be carefully studied as to conditions and safe speeds, and zoned accordingly.
6. Odd-number highway lanes and

multi-lane undivided highways are conducive to accidents, especially when approaching the highway capacity.

7. When the volume of traffic is large, multi-lane divided highways should, when possible, be provided for safety and convenience.

8. The multi-lane divided limited-access highway with grade separations is the safest type so far developed.

9. Traffic-control devices, signs and markings should be installed only after careful study of conditions. They should be kept at a minimum consistent with clarity and safety.

10. Billboards and confusing signs should be prohibited, especially near intersections and along heavily traveled urban approaches.

11. There is need for more driver education.

12. Traffic control should be uniform for similar conditions.

13. Traffic control should be clear, concise, reasonable, and enforceable.

14. Enforcement should be impartial and constant.

15. Reports of speed studies are inconsistent and conflicting.

16. There is a great need for more uniformity and completeness in traffic-accident investigations and reports.

17. The question of speed control is the most controversial, difficult and important element of traffic control.

18. Proper and adequate traffic control requires the cooperation of the police, traffic engineer, road builder, and

the judiciary.

Copies of this 72-page booklet, which discusses in detail the material on which the above conclusions are based, may be secured without charge by Traffic Engineering and Road Building Associations, and Public Libraries for their files direct from the Eno Foundation for Highway Traffic Control, Inc., Saugatuck, Fairfield County, Conn. To others, the price is \$2.00.

Engines FROM 90 to 215 HP. Generators FROM 60 to 115 KW

More Power  
**MURPHY DIESEL**  
More Profit

**MURPHY DIESEL COMPANY, 5319 W. Burnham St., Milwaukee 14, Wis.**



Baker Hydraulic Gradebuilder on an Allis-Chalmers tractor skidding a scow over a Baker-built road, from the railroad to the "under-lake" mining project. C. A. Pitts, Ltd., Toronto, Ont. are general contractors.

## with Baker Bulldozers!

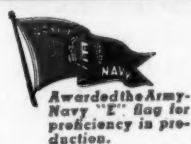
An estimated 30 million tons of much-needed, good quality Bessemer hematite iron ore, in three lodes, lie at the bottom of Steep Rock Lake, Ontario, Canada, just north of the Minnesota border. Five-sixths of it can be removed by open pit mining. To get at the ore, two-thirds of the lake must be drained, involving 125 million gallons of water, and the other third dammed off. A river flowing through the lake must be re-routed making use, where possible, of adjacent lakes and existing streams. This will necessitate numerous dams, earth fill dikes, excavation of channels, clearing of land and the building of many roads, each from 3 to 15 miles long. Finally, right-of-way must be built for trackage from the mine to a railroad 3 miles away.

Logically, a number of Baker Hydraulic Bulldozers and Gradebuilders are being used to rush this job to completion. Operations were started in the spring of 1943. Baker's capacity for getting vast quantities of dirt moved faster—its ability to 'doze' trees, logs and boulders and to pile, spread, level and compact, make it tailor-made for this job.

Bakers are earning "Distinguished Earth-moving Crosses" on scores of war jobs, piling up performance records that deserve your attention when you buy post-war equipment!

**THE BAKER MFG. CO.**  
585 Stanford Ave. Springfield, Ill.

"If It Concerns Victory, It Concerns Us!"





## Present Road Problems And New F-A Formula

(Continued from page 28)

We recognize the dire need for the development of urban highway facilities, particularly trunklines and expressways through cities and the principal feeders to them. In the presentation of the subject "The Need for the Development of Urban Routes", before the House Committee, H. A. MacDonald, Commissioner of Public Works of Massachusetts, very ably and clearly pictured the problem and the needs in the urban field.

Likewise, the secondary, local and feeder-road problem has been recognized more strongly than ever before. This problem, which may call for some different type of consideration, was clearly outlined to the Committee by Fred R. White, Chief Engineer, Iowa State Highway Commission. The changing pattern of needs on the Federal-Aid system, the demand for modernizing of existing main highways and all of the involved problems were clearly presented by C. H. Purcell, Director, California Division of Highways.

Summing up these changed problems, we can arrive at only one logical conclusion. The formula needs some changing.

### Formula Changes Proposed

The American Association of State Highway Officials a year ago recommended a change in the existing formula, using the same factors but giving one-half of the weight to population, one-fourth to area, and one-fourth to post-road mileage. However, the consensus of the majority of the members of the Association seems to favor some additional appropriation or part of the total for urban improvements to be allocated through a separate formula having one factor only, that being population of municipalities over 10,000. This matter has been discussed at length and there seems to be little objection and much support.

The Congress in the past has never given the urban problem any special consideration. This is a new problem and calls for separate and different treatment than the regular Federal-Aid and rural highway problems. Hence, the need for a separation of items in the appropriation and separate formulae; two problems widely different call for two answers. This is further emphasized by the fact that in some states the urban problem is by far the greatest while in others it is relatively the lesser problem. Through a single formula it would be difficult to equalize these wide variations. In urban problems mileage is not a sound basic factor and neither is area; therefore, we have only one measure left and that is population.

There are several different combinations which could be used. A part of the total could be allocated under the formula recommended by the Highway Officials Association and a part under the so-called "urban" formula. Or by altering the amounts of the two items, a part could be allocated under the existing Section 21 formula and the balance under the urban formula.

### Allocation Within States

There has been considerable discussion as to how urban funds and the local and secondary-road funds should be allocated within the states after the state level has been reached. There is also the problem in some states where on the state highway itself one system is much more nearly completed and in far better condition than the other system. These matters give rise to the need for the maximum flexibility possible, consistent with sound practice and subject to suitable regulation.

It has been suggested that each state highway department submit to the Public Roads Administration an equitable plan for allocation of secondary-road funds within the state. This plan should be presented after the state has consulted with duly authorized representatives of county road officials in the state. The Public Roads Administration could, after investigation, accept or modify and approve the plan in each state. Due to widely different conditions in the several states, it is felt that some such plan would more nearly meet local conditions than would a single and uniform plan.

There is also the problem of working out a formula for the allocation of urban-road funds within the state. This is true even though some part of the total may be expended on the Federal-Aid and state systems inside the municipality and a part of it off these systems. It would seem that a reasonable fair basic plan would be to use the population of each of the several municipalities having a population of 10,000 or over.

(Concluded on next page)

## GEERPRES TANGLEPROOF MOP STICK

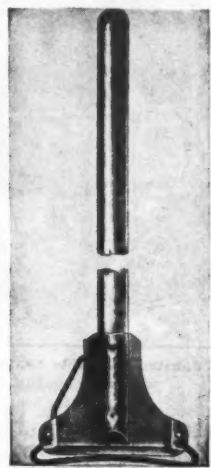
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clamps to tangle  
mops or injure  
furniture

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Long Life  
Nothing to Wear Out

## G. I. finds a friend



G. I. (as the Yank soldier prefers to call himself) has to handle a lot of wire rope these days. On landing barges . . . on cranes, hoists, and power shovels . . . and especially on trucks and tanks, most of which carry an emergency winch cable as standard equipment. For such uses, Bethlehem has supplied millions of feet of wire rope—much of it in our top-quality Form-Set (preformed) construction.

When a truck is mired, or when there's a heavy hauling job to be done, the G. I. winch cable is a friend in need. And when it's supple, easy-handling Form-Set it's doubly a friend. That means a lot to G. I., who as likely as not was a traveling salesman or grocery clerk in civilian life, and had no experience in handling wire rope.

Because its strands and wires are preformed in their corkscrew shape, Form-Set is free from locked-up constructional tensions. It's easy to splice and spool, requires no seizing, and sprouts no spiny wire bristles to slash the hands of men who work with it. All of which explains why Government agencies have bought it in such vast quantities for military operations.

You get the utmost in service and long life from Form-Set when it's in the Purple Strand grade. Purple Strand wire rope is made of strong, tough Improved Plow Steel, the highest-quality steel that's used in wire-rope construction.

In Form-Set Purple Strand you get the ideal combination of preformed ease of handling with the unmatched strength and ruggedness of Improved Plow Steel. Plan to order it for your next wire rope job, or for replacements. But make your plans, please, as far in advance as possible, so that you will be sure to have Form-Set Purple Strand Wire Rope when you need it.

Form-Set  
Purple Strand  
Wire Rope

★ ★ BETHLEHEM  
STEEL ★ ★



# New Federal-Aid Bill Is Discussed by Sours

(Continued from preceding page)

However, in order that some badly needed projects might be handled in certain distressed municipalities, some thought might be given to setting aside some part of the state's urban fund to be used on major urban projects where most needed and the balance then allocated according to the prescribed formula.

In any event, if the bill carries an appropriation covering two or more years, and if the urban and the secondary-road funds are allocated within the states by formula, it should be permissible to carry out the expenditures in the several local subdivisions in a manner which would require only that the total amount in each case be used in the period as a whole and not restricted so that the allotted amount be expended each year. Practical usage of funds requires in many cases more than one year's allotment to be used in one year. The use of a two or three-year apportionment makes flexibility in a law again desirable.

## Summary

In summing up, these are the most important points I have tried to make:

1. There definitely should be a continuation of the formula method of allocating Federal highway funds.

2. We are facing some serious and badly neglected problems in the urban areas where the traffic volumes are the heaviest; we likewise find the local and secondary-road problem becoming more important.

3. To meet these changed conditions and problems there is a need for some formula changes.

4. There should be some control by formula of the allocation of urban and of secondary-road funds within the states.

5. There should be a maximum of flexibility in the use and allocation of funds, subject to sound regulation.

## New Tamping Rollers

Two types of tamping rollers for compaction of earth in dams, levees, roads, and similar projects are made by the Wentz Equipment Co., 600 Van Buren St., Topeka, Kansas. This Tam-Pak sheepsfoot roller is equally effective and economical in either light or heavy earth, the manufacturer states, tamping, kneading and tying the layers of earth into one firm integration.

The Model K is a single-drum unit, while Model H is a double-drum, with oscillating feature. Both models are of electric welded construction, mounted on anti-friction bearings with floating axles. The tube through the center of the roll is extra heavy, to add strength and durability to the unit. Fill caps provide an opening for liquid ballast. Pull connections are furnished on the rear of both models to permit working in trains. The feet are scientifically designed and spaced, and feet cleaners are standard equipment on the rear, while front feet cleaners are available at extra cost. The

drums on both models are 40 inches in diameter and 48 inches long, with 110 7-inch tamping feet per drum. With the Model K single-drum model, the pressure per tamping foot with the drum empty is 712 pounds and with the drum filled is 1,170 pounds. In the double-drum model, the pressure per tamping foot, with the drums empty, is 698 pounds and with the drums filled, 1,150 pounds.

Further information on Wentz Tam-Pak tamping rollers is contained in a bulletin which may be secured direct from the manufacturer by mentioning this magazine.

## Kotal Appoints Sales Engineer For West Coast

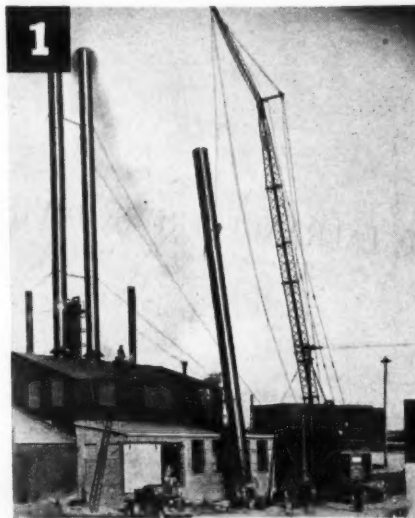
Arthur J. Pilgerrim, formerly with the Bureau of Public Roads and the United States Engineering Department, has been added to the staff of the Kotal Co., Summit, N. J., to serve as its representative on the west coast. Mr. Pilgerrim, who has been active in construc-



Official U. S. Navy Photo  
A Caterpillar diesel D6 with a LaPlant-Choate trailblower, operated by Navy Seabees, at work on Tarawa after the U. S. Marines had completely wiped up the Japs.

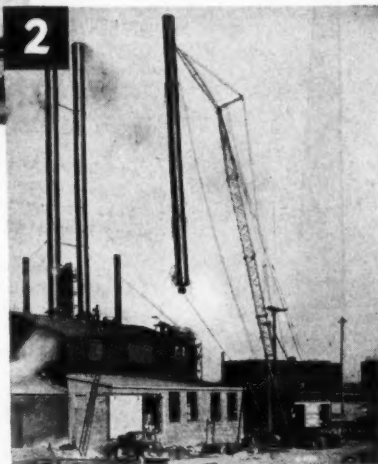
tion work in this territory for a number of years, will make his headquarters with the Smith Booth Usher Co., 2001

Santa Fe Ave., Los Angeles, Calif., Kotal distributor for California, Nevada and Arizona.

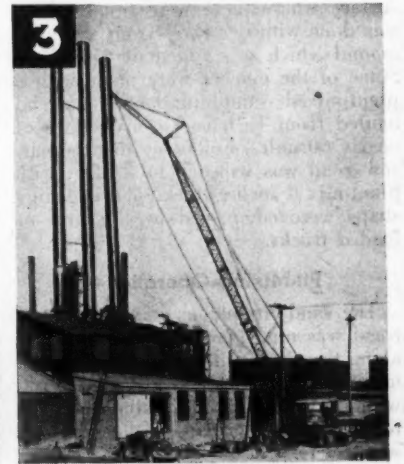


## READY

Here's how easily and economically Contractor Henry Selinsky handles an 80-foot, 3-ton stack with his GENERAL Supercrane, equipped with 100-foot boom.



## IN THE AIR



## COMPLETE

Resourceful use of his rubber-tired, one engine, one man-operated GENERAL Supercrane is an everyday occurrence with Contractor Henry Selinsky, of Canton, Ohio. For example—

After a hurricane leveled part of a war plant, Selinsky added an extra 50 feet of boom and passed new girders over other buildings (in which war production continued) to complete the new structure in record time.

This 100-foot boom also made quick work of the setting of a new 80-foot, 3-ton stack (as pictured above) and on another war plant job, he handled 13-ton storage tanks fast

and accurately, working at an 18-foot radius with his Supercrane.

These are typical of how easily and economically the toughest jobs are handled by General Supercranes. Of GENERAL'S dependability and versatility, Selinsky writes: "I can't say enough for the General . . . it's a real crane." For all the aggressive contractors like Henry Selinsky, General has developed the Supercrane one step farther in engineering the "Machine of Tomorrow" which will set new standards of performance in post-war materials handling and construction-excavating fields.

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**SHOVELS DRAGLINES - CRANES**  
Crawler & Wheel Mounted

**THE GENERAL EXCAVATOR COMPANY, Marion, Ohio**



# Pit-Mixed Retread On a Widened Base

## Florida Improves U. S. 319 Serving Both Military and Civilian Traffic Within Camp Gordon Johnston

U. S. 319, connecting Tallahassee, the capital of Florida, with the east-west Gulf Highway, U. S. 98, has long been subjected to heavy traffic. The construction of Camp Gordon Johnston for training Amphibian Engineers and other troops maintained the volume of traffic as civilian travel lessened, and greatly intensified the weight of traffic. A severe winter added to the damage so that on February 11, 1943, state forces with rented equipment started the widening and retreading of three sections of the highway totaling 13.8 miles, mostly within the reservation. Work was completed September 1, 1943, after seemingly interminable delays due to rains which in some weeks permitted only two days of work in seven.

### The Old Road

The old road was an 18-foot surface-treated highway on a sand-clay base. The clay for this base had been hauled in by rail from Tallahassee and mixed with the sand in place to give a 4-inch compacted base. It was inadequately mixed because of a lack of proper equipment at the time, 15 years ago, and consequently had many failures.

The first operation in preparing the old road for retread was to patch the surface where there were breaks. This was done with dry shell from a nearby mound which was rolled dry in place. Some of the patches were made with a plant-mixed sand-bituminous material hauled from Tallahassee, a distance of nearly 60 miles. Following this the narrow road was widened to 22 feet with plant-mix 4 inches thick. The widening strips were compacted by the tires of loaded trucks.

### Pit-Mixing Operations

The sand-bituminous mix for the retread was mixed in three different pits along the road, using a Jaeger traveling mixer running back and forth in the pit, with a trailer alongside feeding the RC-1 to the mixer. The strips in the pits were 500 feet long in one and 1,000 feet long in two others. In Pit 1, which was at right angles to the road and within the military reservation, a ditch was required to drain it to a lake about 100 yards from the end away from the road. These pits were worked to a depth of about 3 feet to secure the best gradation of aggregate. The soil in the pits is classified as A-3 and has a bearing value of 30 to 40 pounds per square inch. The gradation of an average sample is as follows:

Passing 40-mesh screen	91 per cent
Passing 60-mesh screen	70 per cent
Passing 200-mesh screen	6 per cent

The materials comprising the sample are classified as clay 2 per cent, silt 2 per cent, and sand 96 per cent.

The material in a pit was windrowed by a Caterpillar No. 12 power grader so that the windrow could be straddled easily by the Jaeger mixer which had a feeder opening 6 feet wide. One passage through the windrow was sufficient to incorporate from 4 to 6 per cent asphalt with the pit material and produce a homogeneous mix. During the first part of the operations, the mixed material was aerated in the pits with blades and disk harrows. Later, in summer, when there was less traffic, the aerating was done on the road.

The mixed material was windrowed in the pit and then picked up by a Hanson 3/8-yard dragline, loaded into 1 1/2-ton

trucks, and hauled an average of 6 miles and a maximum of 13 miles to the site of the work. A maximum of 18 trucks was used at one time for this work with a load of 2 1/2 yards per truck.

The asphalt for the work was delivered in tank cars on the nearest sidings, which required hauling by two tank trucks each of 1,900 gallons 7 1/2 miles to one pit and 8 miles to another from the same siding. For the third a different siding was used, requiring 8 miles of travel over a better road. The tank trucks were filled by a centrifugal pump from the tank cars, no heating being required.

When the base had been patched and the road widened, the entire surface was given a tack coat, one-half width at a time to permit traffic to get through at

all times, using 0.1 to 0.12 gallon of RC-1 per square yard, applied by a state-owned Littleford maintenance distributor with a power pump delivering the asphalt to the 11-foot spray bar. After one side had been tack-coated and the retread spread, the tack was applied to the other side while traffic ran on the completed retread.

### Retreading the Road

The trucks delivered the pit-mixed material to the road and dumped it along the road at one side to permit traffic to use the balance of the highway. These piles were broken down and spread by a Caterpillar No. 12 power grader to a uniform 2-inch thickness one-half the width of the road at a time. On one of the short sections the pit-mixed material was spread from 3 to 6 inches thick to develop greater bearing in the sand base, which was not widened. The retread was compacted by a 7-ton Buffalo-Springfield tandem roller and the wheels of the power grader.

While traffic was using both sides of the road after the two halves had been completed, the entire road was disked for a depth of 2 inches, bladed to improve the surface cross-section, and compacted by traffic and roller. In some instances traffic did kick out some of the retread. Where traffic compacted the retread before it had been completely aerated and cured, it was necessary to go back with a scarifier and take up the section and rework it with the disk harrow to break it up completely. The reworked sections where the work was done under light traffic have come out the best as to cross-section and surface smoothness.

The last operation was the finishing of the shoulders and the cleaning of the ditches by hand.

The work described was done by maintenance forces of the Florida State Road Department, under the direction of W. A. Kratzert, State Maintenance Engineer, by Division 3, H. H. McCallum, Division Engineer, and C. R. Horne, Division Maintenance Engineer.

## WARD LAFRANCE TRUCK DIVISION

GREAT AMERICAN INDUSTRIES, INC.

ELMIRA



NEW YORK

### MEMORANDUM TO THE ADVERTISING AGENCY

FROM: A. Ward LaFrance, Vice President  
Great American Industries, Inc.

SUBJECT: POSTWAR WARD LA FRANCE TRUCKS FOR FLEET OWNERS

As you know, there are some interesting, perhaps revolutionary, ideas under development here at our Elmira plant, and I know you can't wait to tell prospective users about them. That is understandable. But please keep this clearly in mind:

Motor truck fleet owners are practical people. They are badly in need of replacement vehicles, and they are interested in the proved ideas which can be incorporated in trucks available just as soon as manufacturers can return to civilian production. We have some fundamentally important things to tell these gentlemen, so let's not waste paper on gaudy promises and fanciful pictures of beautiful, streamlined dreams of postwar models.

Let's try to get the fact across that Ward LaFrance trucks have a twenty-five year reputation for being good trucks. Let's admit frankly that Army Ordnance engineers have increased our know-how and made it possible for us to build still better ones after the last M-1 Heavy Wrecker has been delivered.

Fleet owners should be particularly interested in our new policy of concentration on their needs. This is of great importance because it will enable us to engineer and build vehicles to their exact needs. Fleet owners will recognize that this policy will result in a truck which will out-perform and outlive standard production models in a great majority of cases. Chances are, however, people will assume such trucks will cost too much. If you people in the agency can persuade fleet owners to get the facts from our engineering staff, that is all we ask of you. We can demonstrate clearly the fundamental economy of the new Ward LaFrance policy to any fleet owner's satisfaction.

*A. Ward LaFrance*

A. Ward LaFrance.

GREAT AMERICAN INDUSTRIES, INC. - GENERAL OFFICES, MERIDEN, CONNECTICUT  
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CONNECTICUT TELEPHONE & ELECTRIC DIVISION, MERIDEN, CONNECTICUT  
WARD LAFRANCE TRUCK DIVISION, ELMIRA, N. Y. - FACTORY BRANCH, 139TH ST. & EASTERN BLVD., NEW YORK  
VIRGINIA RUBATEX DIVISION, BEDFORD, VIRGINIA  
RUTLAND ELECTRIC PRODUCTS DIVISION, RUTLAND, VERMONT



### Colored Lead Pencils Durable, Non-Soluble

Tough-fibred, non-soluble colored pencils of thin lead which is reported able to withstand above-normal pressure, and can be sharpened to an almost unbreakable fine point, are announced by the Reliance Pencil Corp., 22 South Sixth Ave., Mt. Vernon, N. Y. Featured by smoothness in writing and wear-resistant qualities, these Excelsior pencils are especially adaptable for checking, map-making, records, blueprints and other types of work where a colored pencil is required. The lead is bonded to the wood casing by an exclusive process,

so that it forms one solid unit of unusual strength, and for quick identification of colors the wood portion of the pencil is finished in brilliant enameled colors to match the lead.

More complete information on Excelsior pencils may be obtained by written request to the manufacturer and mention of **CONTRACTORS AND ENGINEERS MONTHLY**.

### Frost Acquires Penn Distributor Company

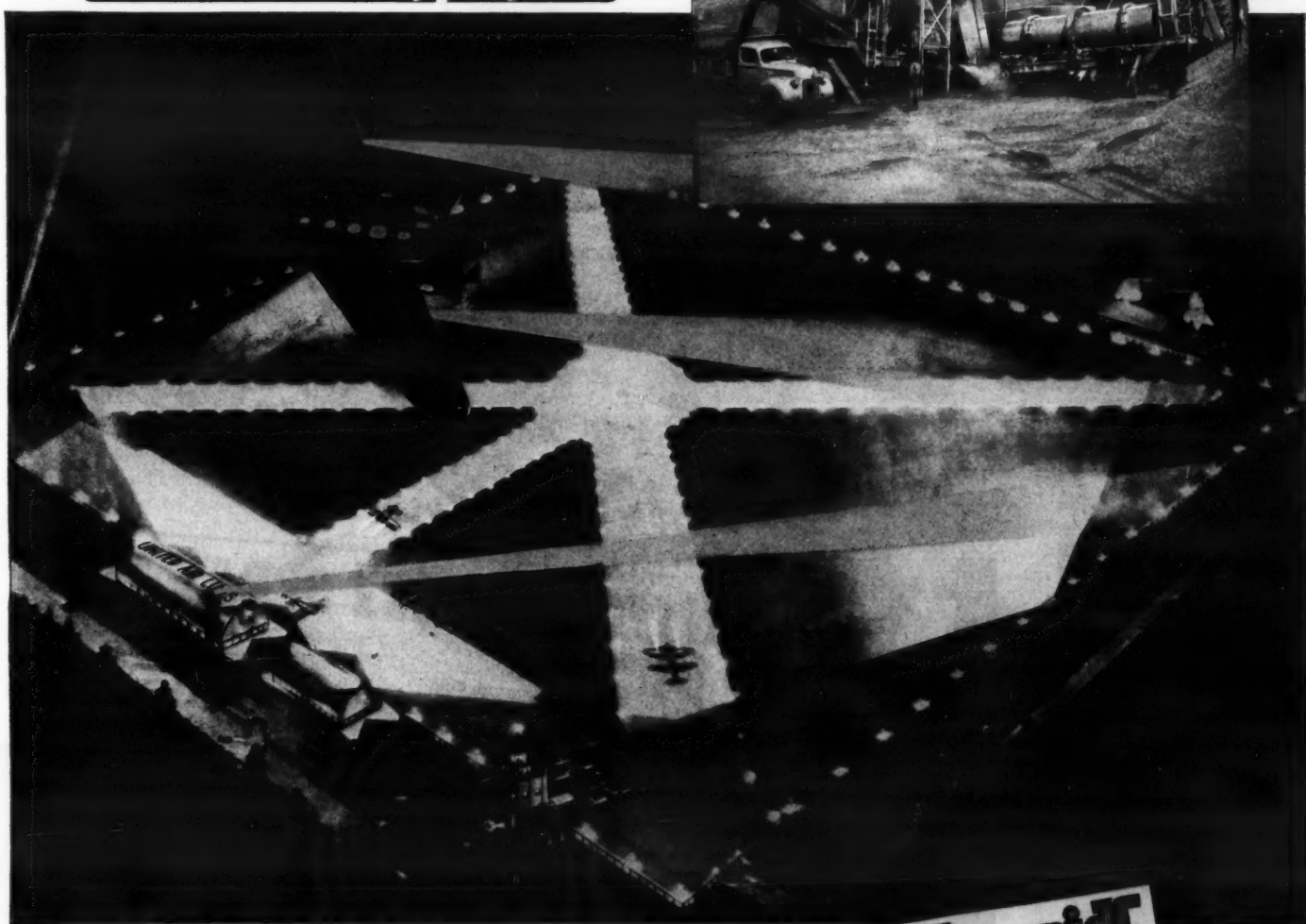
Announcement has been made that H. O. Penn, President of the H. O. Penn Machinery Co. of New York and the

Michigan Tractor & Machinery Co. of Detroit, distributors of highway and construction machinery, has sold his entire interest in the latter company to "Jack" Frost, who has been serving as Vice President of the Penn New York organization. This change, initiated by Mr. Penn, has the dual motive of permitting him to devote all of his attention to the New York organization, which has recently taken on distribution of Caterpillar products in the Connecticut territory, and to offer wider opportunities to Mr. Frost in recognition of his important contributions to the development of the H. O. Penn Machinery Co. during the past fourteen years.

### Marion Representative Named for New England

Announcement has been received of the appointment of Edward J. O'Connor as New England representative of the Marion Steam Shovel Co., Marion, Ohio, with headquarters at the company's office at 10 Damrell St., South Boston, Mass. Mr. O'Connor's experience in the field, extending over twenty years, includes design engineering for the Massachusetts and Illinois State Highway Departments, the sale of heavy construction equipment, and service as engineer and general superintendent on airport, highway, bridge and gravel plant operations.

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To the global airlines, highways to the sky are runways that are safe, smooth, permanent, and have tremendous load-carrying capacity. The engineer and contractor see them as aggregate at so many cents per yard. And, that price has to be the lowest possible.

Refinements in crushing equipment are lowering production costs despite increasingly strict specifications. Such improvements are the result of American free enterprise which developed the line of Cedarapids plants.

When you have a contract to build tomorrow's HIGHWAYS TO THE SKY, use aggregates produced by Cedarapids crushing plants. All sizes and types available. You'll get better results and it will cost you less.

*Remember it's Iowa — headquarters  
for Aggregate Producing Equipment!*

**IOWA MANUFACTURING COMPANY  
CEDAR RAPIDS, IOWA**

**Cedarapids**

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Ewing Galloway

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- DRAG SCRAPER TANKS
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- STEEL TRUCKS AND TRAILERS
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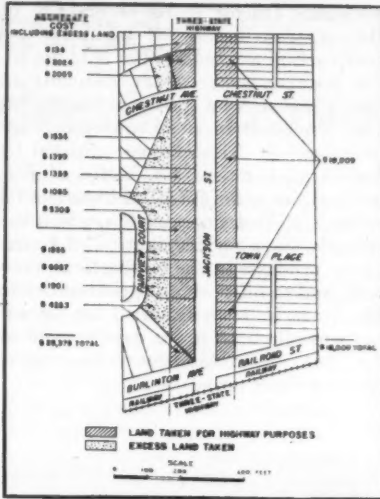
## R/W Costs Studied For 3-State Highway

(Continued from page 25)

cent had to be condemned. Resort to court proceedings is likely to add a minimum of from \$300 to \$400 to the costs of a given acquisition. Donations were few, except in Milwaukee County, Wis., where the practice seems to prevail of offsetting the benefits accruing to property from an improvement against the value of land acquired, one invariably canceling the other.

**Wisconsin Award System:** The so-called statutory award system in Wisconsin seems to expedite the acquisition of lands and the construction of highways. The state or a county makes an award deemed to be the value of land and compensation for damages and tenders that amount to the property owner. Construction may commence immediately afterward. If a tender is not accepted, the award is deposited with the county clerk or other designated officer to be held by him in trust for the property owner until accepted or until the procedure is terminated by a formal settlement consummated through other proceedings. Illinois has no such summary procedure.

**Total Acquisition Costs:** The average total cost of land acquisition per mile for the Three-State Highway was \$17,124; of this total, 29 per cent represents the cost of "bare" land, 69 per cent the



The location of marginal or excess land acquired on a 1,000-foot length of highway in the village of Clarendon, Du Page County, Ill.

amount of damages, and 2 per cent the

out-of-pocket expenditures of services incidental to acquisition.

**Population Density:** Although only 8.7 per cent of the area acquired was in suburban territory, 16.0 per cent of the total cost of \$1,228,281 was incurred therefor; 8.4 per cent of the area, located in urban sections, required 19.3 per cent of the total cost; and 82.9 per cent of the area was in rural places and accounted for 64.7 per cent of the total cost.

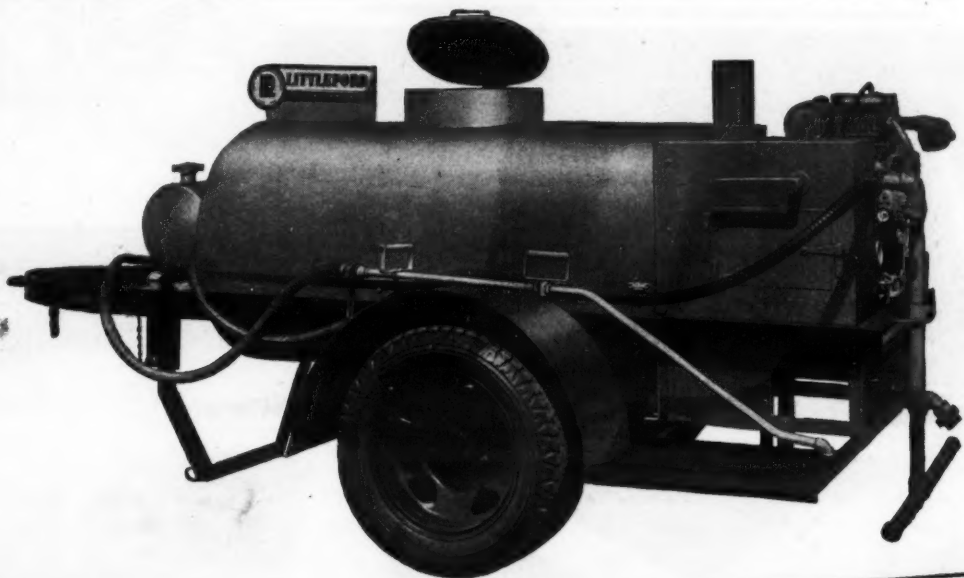
**Costs Per Mile and Per Frontage-Mile:** The average cost per frontage-mile for all property acquired was \$9,812. The average cost in rural areas was \$7,580 per frontage-mile, in suburban areas almost twice as much, and in urban places more than four times the rural average. These frontage-mileages translated into ordinary mileage costs indicate that the cost of acquiring property necessary for the Three-State Highway was approximately \$15,000 per mile through rural areas, \$29,000 per mile in suburban territory, and \$67,000 per mile in urban places.

**Costs of "Bare" Land:** The purchase of 718 acres of "bare" agricultural land entailed an expenditure of \$90,763, or \$126 per acre. A frequency distribution of unit land costs shows that the median land cost was \$145 per acre for all farm lands, \$774 per acre for residential lands in rural areas, and \$2,033 per acre for residential lands in urban areas.

**Damages and Incidental Fees:** Damage costs averaged \$11,801 per mile of highway. Out-of-pocket incidental fees averaged \$330 per mile of road.

**Marginal Land Acquisition:** Forty-two parcels of marginal or so-called "excess" land, aggregating 25.6 acres, were purchased at an estimated total cost of \$30,823. The parcels are largely in Du Page County, Ill. Of this land, 14.7 acres were traded for other lands needed for highway purposes, 0.6 acre was sold, 2.7 acres were transferred to other governmental agencies, and 7.6 acres still remain in county ownership. Some surplus land was purchased in order to avoid the payment of large amounts of

(Concluded on next page)



### MODEL No. 101 UTILITY SPRAY TANK

Here's a Unit that will cut post war Black Top Construction and Maintenance costs to a minimum. Designed by Littleford to do three jobs instead of one. Model No. 101 will handle tar, asphalt, cutback,

and emulsion. Model No. 101 is heated by Littleford Vaporizing Torch Type Burners. When planning for the future, include a Littleford Model No. 101 Utility Spray Tank; why purchase three units when the No. 101 will do the work.



1 Model No. 101 can be used as a Distributor, has Spray Bar for small application jobs.



2 For crack filling, Model No. 101 has pouring pot outlet.

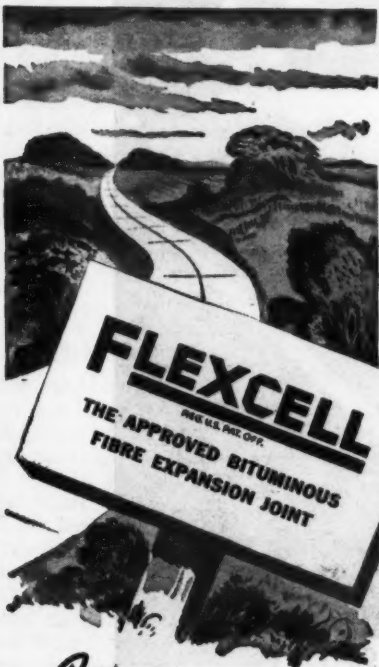


3 Spraying patches with the Hand Spray is the popular use for the Model No. 101.



**LITTLEFORD**

LITTLEFORD BROS., Inc.  
485 E. Pearl St., Cincinnati, Ohio



For

### Highway and General Concrete Slab Construction

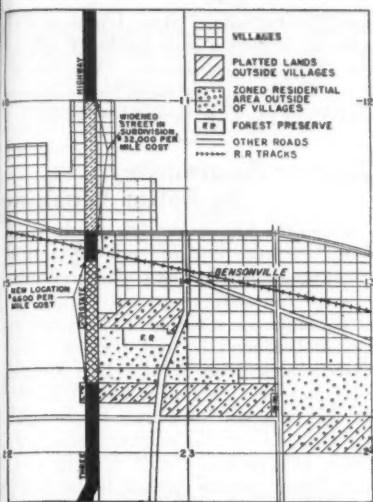
**FLEXCELL**, made by The Celotex Corporation, is the modern approved expansion joint that compresses under pressure but never extrudes. It springs back when expansion pressure is eased.

Can be used two ways—set flush or set below the slab surface with poured capping.

Flexcell helps to make concrete paving last longer because there's "never a bump in a million miles." Write for sample and complete information.

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**BITUMINOUS FIBRE EXPANSION JOINT**





A comparison of the cost of sections of the Three-State Highway in Bensonville, Ill. Where a street was widened in a subdivision, the cost was \$32,000 per mile, while on new location the cost was only \$6,600 a mile.

occasional fire hydrants in vacant lots. Immediately south of the tracks of the Chicago, Milwaukee, St. Paul & Pacific Railroad, the highway was relocated through unplatted territory for a distance of some 3,000 feet. A 200-foot right-of-way was obtained at an approximate total cost of \$6,600 per mile. The nature of the land traversed by these two sections of highway was the same in all essential respects except that the property taken for widening was subdivided land and that taken for relocation was unplatted. Acquisition costs for widening on a per mile basis were almost five times as great as those for relocation.

A more detailed discussion of the problems and costs involved in the acquisition of right-of-way for the Three-State Highway will be found in the complete study published in *Public Roads*, Vol. 23 No. 10, for October-November-December, 1943, pages 253-266.

*Proper lubrication will lengthen the life of your machines. Be sure that it is done regularly.*

## Manganese Steel Rods For AC or DC Welding

Manganal welding electrodes, of 11 to 14 per cent manganese steel, for the repair of shovel and dipper teeth, gyratory, jaw, roll and cone crushers, pump shells, impellers and side plates, buckets and dippers, tractor treads, gears, rollers and grouser cleats, post-hole diggers and augers, grader and snow-plow blades, and similar equipment and parts subjected to hard usage and abrasion are available in 1/4, 5/16, 3/16, 5/32 and 1/8-inch sizes for either ac or dc welding. In addition, the Stulz-Sickles Co., 134-142 Lafayette St., Newark, N. J., producer of Manganal, also offers Seaco hard-facing electrodes in 1/4, 3/16 and 5/32-inch sizes; Manganal applicator bars for welding and resurfacing broken and worn down manganese and carbon steel parts; special-shape Manganal applicator bars especially designed for replacing by welding worn tractor grousers and bucket lips; and cast wedge bars for repointing manga-

nese and carbon steel shovel and dipper teeth.

Two folders issued by this company are of help to those concerned with the maintenance and repair of equipment by welding. One of these is devoted to the "Let's Get Acquainted" Manganal introductory package, by which the purchaser can try out both Manganal and Seaco hard-facing welding electrodes. The other is a booklet on the welding of 11 to 14 per cent manganese steels, in which each welding operation is described in detail, with amperage requirements and recommendations for the type of electrode to be used. There are many photographs and diagrams, and a question-and-answer section on welding problems. A complete list of Manganal welding products is also included.

Copies of these folders may be secured by interested contractors and state and county highway equipment superintendents direct from the company. Just mention **CONTRACTORS AND ENGINEERS MONTHLY**.

## Relocation Land Costs Cheaper Than Widening

(Continued from preceding page)

consequential damage because of severance and destruction of plottage value. In general, the device of marginal land acquisition was used quite successfully in Du Page County.

### Widening versus Relocation

The attention of highway authorities has been focused for some time upon the economics of highway widening and highway relocation. Analysis of the cost of widening and relocating sections of the Three-State Highway seems to indicate that land-acquisition costs of widening are considerably greater than those of relocation. The most striking illustrations of this difference in cost are found in Kenosha County, Wis., and Du Page County, Ill.

Four miles of highway in northern Kenosha County coincided with the existing U. S. 41, which was widened from 66 to 120 feet. A 5-mile section in that county was on new location with a 120-foot right-of-way. The total cost of the widened portion averaged \$6,404 per mile, of which \$5,521 constituted damage payments. The total cost on the relocated portion averaged only \$3,752 per mile, of which \$2,260 constituted damage costs. It was expected that the land costs for the 120-foot width required on new location would exceed those for the 54-foot width required for widening. The areas traversed by these sections of highway were similar in all essential respects, and the properties were acquired at the same time by the same agencies under similar conditions.

Another instance of the relative economy of relocation is found in Du Page County, Ill. A considerable portion of the existing street, 100 feet wide, in the city of Bensonville, was widened to 200 feet, 50 feet being taken on each side, at a total cost of approximately \$32,000 per mile. This was "raw" subdivision territory, without other development in the area than the startling presence of

## HOUGH

Cable-Operated Tractor Shovels For International T-6, TD-6, T-9 and TD-9 Tractors

Hough cable-operated shovels are extremely easy to operate because of proper balance and easy to maintain because of fully enclosed clutches and brakes. The automotive type main drive from engine crankshaft to hoist through hardened steel gears and propeller shaft equipped with universal joints eliminates chains and belts. Clutches, brakes, gears, bearings, etc. are over-size and of ample capacity for the most abusive service. Raising time of loaded 1/2 or 3/4 yd. bucket is 9 seconds, and lowering time only 2 seconds.

These rugged, time and cost lowering shovels have proved economical in cost-per-yard handled. They are shipped completely mounted—ready for operation. Write for descriptive bulletin or call your nearest International Industrial Tractor Dealer.

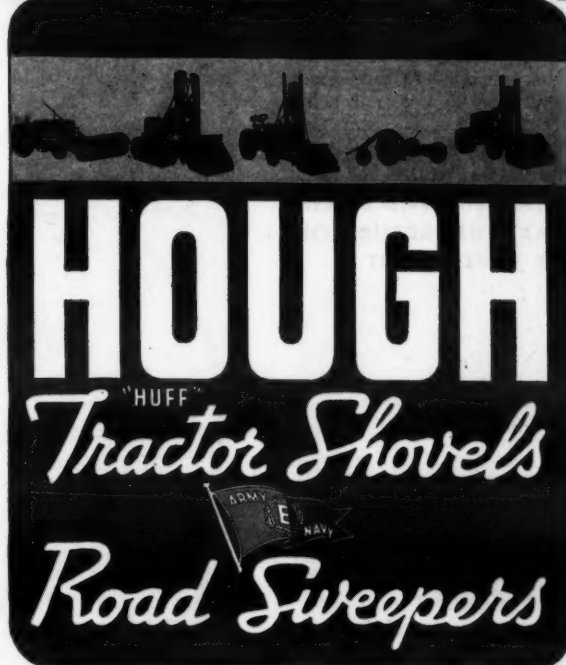
**THE FRANK G. HOUGH CO.**  
Libertyville, Illinois  
"Since 1920"



## BETTER



## BALANCE



### A BULLDOZER—BY QUICK CONVERSION

In less than 10 minutes the buckets can be removed and bulldozer blades attached. Both straight and reversible blades are available. All blades are equipped with hardened reversible cutting edges. Mushroom type grading shoes are standard equipment. Blades can be quickly set to angle right or left, or for bulldozing straight ahead. Maximum ruggedness is inbuilt.

There are over 3000 Hough Tractor Shovels in Service

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U. S. Army Signal Corps Photo

U. S. Engineers lay a portable pipe line in Sicily. It is possible, under normal operations, to lay 8 miles of pipe a day.

### Constructive Ideas For Post-War Work

The engineering-personnel bottleneck which has caused so much delay in the preparation of state and county highway plans for post-war construction may not be too great a hazard to the pending construction program, according to S. C. Hadden, Chairman, State Highway Commission of Indiana. There is a very large outstanding and greatly needed volume of resurfacing and widening of state highways which cannot be undertaken now because of lack of men, equipment and materials. While a certain part of this might be included in new construction after the war, the greatest part of it will be done then as deferred maintenance by contract. This volume of deferred activity in Indiana alone amounts to \$18,000,000 for widening alone and a much larger sum for resurfacing, which Mr. Hadden suggests is an excellent anchor to windward for post-war work while increased personnel are preparing more plans for the larger construction program.

The Federal-Aid bill pending in Congress and on which hearings began February 29, 1944, changes the contribution of the Federal government from one-half the total to be expended to three-quarters, the balance of 25 per cent being

the funds to be provided by the states. A survey of the states by the American Association of State Highway Officials showed that at present there are only two states which are financially able to

match Federal-Aid money on the 50-50 basis. This is because of the great reduction in returns from the state gas taxes on which practically all state highway construction is predicated. For example, Mr. Hadden reports that the gas-tax income in Indiana for 1943 was \$6,000,000 less than in 1942, and all indications are that it will be still less in 1944. There is no doubt, however, that the income from this source will start to rise again as soon as the war is ended, so that states will once more be in a position to match Federal Aid on a more even basis. With this in mind, Mr. Hadden has suggested the possibility of a sliding scale of matching by the states, based on their ability to pay. Thus, for the first year the ratio might be 75 per cent Federal and 25 per cent state money, changing to 60-40 later as conditions improve and the gasoline restrictions are slackened to permit more use of motor transportation by all the public, and finally returning to 50-50 when a more normal condition exists.

Speaking as President of the Amer-

ican Association of State Highway Officials, as well as a state highway official, Mr. Hadden remarked, "We should strive for the earliest possible enactment of the best possible Federal-Aid bill."

### Cleaner Aggregate By Better Washing

When the big construction jobs come along after the war and huge quantities of clean aggregate are needed, contractors will be setting up more and more local plants for washing and classifying the sand needed by the 100,000-cubic-yards. Eagle Iron Works, Des Moines, Iowa, has just released a new illustrated 24-page catalog, No. 44, on Eagle washers, both single and double-screw type, telling how they are built, how they operate, their various special features and a detailed discussion of their operating mechanisms.

Copies of this catalog will be sent to readers of CONTRACTORS AND ENGINEERS MONTHLY writing direct to the manufacturer and mentioning this item.

## St. Louis Contractor Finds LINK-BELT SPEEDER "Tops" for Fast, Trouble-Free Digging in Missouri's "Gumbo" Mud!



## LINK-BELT SPEEDER

Builders of the Most Complete Line of  
SHOVELS-CRANES-DAGLINES

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(A DIVISION OF LINK-BELT COMPANY)

### "CLEVELANDS"

Forerunners of All Full Crawler Ditchers  
ASSURE MAXIMUM RETURN ON  
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Their modern, job proven design puts more dirt off the conveyor. Their super-quality construction makes them keep doing that. From every angle — power, speed, durability — ease of handling and portability — "CLEVELANDS" have proven themselves, on the job, performers of a superior type.

PRODUCTS — Ditchers, Wheel and Ladder Type (in several models) — Side Boom Backfillers, Pipe Cranes, etc.

THE CLEVELAND TRENCHER COMPANY  
"Pioneers of the Small Trencher"



# Concrete Form Work For Hangar Girders

## Heavy, Long-Span Girders At Eastern Field Poured In Wood Forms with Timber Towers for Falsework

ROOF girders of 126 feet clear span, 10 feet 9 inches high at the haunches, and uniformly 3 feet thick, were used as reinforced-concrete members of the structure 36 feet above the floor of the flight hangars at an eastern airfield. Since roof construction began before the concrete floors were poured, because of the desire to enclose the area as early in the autumn as possible, the supporting towers were built on a substantial mud sill and carefully assembled to insure rigidity and control of the elevation of every foot of the girders.

The girders change section uniformly from 11 feet high at the haunch to a 5-foot height 30 feet 6 inches from the ends so that the central 65 feet is of uniform cross section except for a 6-inch crown in 65 feet from the center towards the ends for drainage of the roof.

### The Timber Towers

To provide adequate support for the load to be carried on the three timber towers erected to support each girder, a 10 x 10-foot mat of 4-inch plank was laid as a mud sill on the heavy clay subgrade. This was overlaid by three single and two double 6 x 8-inch timbers spiked together to carry the 8 x 12-inch sill along all four sides of the tower. Diagonal braces of 2 x 8's with two 3 x 8-inch horizontal ties at the one-third points held the 8-foot square towers of six 8 x 8-inch posts rigid.

One of the towers was located at the breaks in the uniform cross section and one at the center of the middle section, or approximately at the quarter points. There were also half towers bolted to the columns at the ends of the girders to carry the I-beams supporting the girder forms in the same manner as the complete towers.

The tops of the towers consisted of 8 x 12-inch timbers 8 feet long carrying a single 14 x 12-inch 78-pound I-beam with oak block stiffeners bolted through the web. This I-beam carried two pairs of 24 x 12-inch 100-pound I-beams running between the towers. Across these were laid 8 x 10-inch timbers 10 feet long with two over the frames at the tops of the towers on 12-inch centers and strung along the I-beams 6 feet on centers between the towers. These 8 x 10-inch timbers carried the mechanical screw jacks which were used to hold the proper camber in the girder forms during pouring to prevent sagging under the load of concrete.

### Forms and Concreting

All girder forms were built up of ship-lap lumber 1 x 6 inches with 4 x 4-inch studs spaced 16 inches on centers. The sides were built of the same material in panels 6 feet long for convenience in handling. No lining was used in the forms which were tied with Richmond Tyscrus, using 3/8-inch rods.

The column forms were also built of shiplap and three sides were completed, then the steel was assembled on the ground, placed inside the open form by a crane, the fourth side put into place by the crane, and the form tied securely with Richmond Tyscrus. The steel for the girders was built up in place within the forms.

Concrete for the girders and columns was supplied by a central mixing plant about 3 miles distant from the buildings. The contractor set up his own batching plant for his fleet of truck mixers which hauled and mixed the structural con-

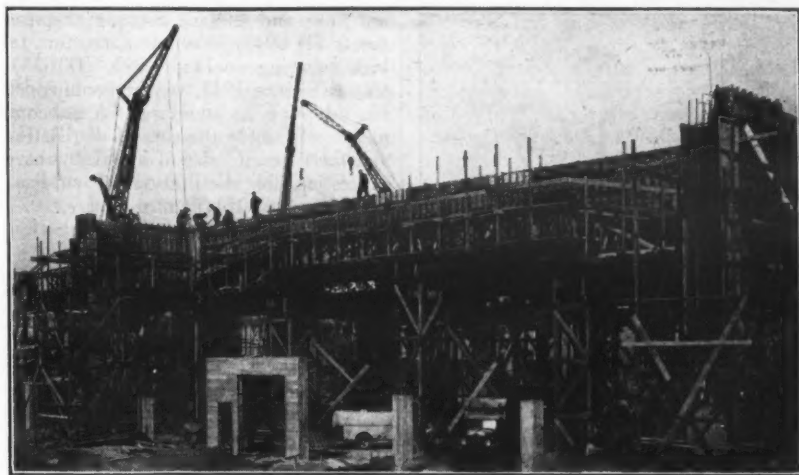
crete.

The concrete for the girders was mixed 6 1/2 bags of cement per cubic yard, with a sand-aggregate ratio of 38 per cent, a water-cement ratio of 5.5 per cent, and the proportion by weight was 1:1.97:3.23 for the 4,200-pound batches.

Cranes with bottom-dump buckets were used for pouring the tops of the columns and the girders, while side-dump buckets were used for the main portions of the columns.

### Personnel

The contract for the construction of this reinforced-concrete flight hangar was awarded by the Syracuse, N. Y., District, U. S. Engineer Department, to Poirier & McLane Corp. of New York City, for whom Bertram Jordan was Su-



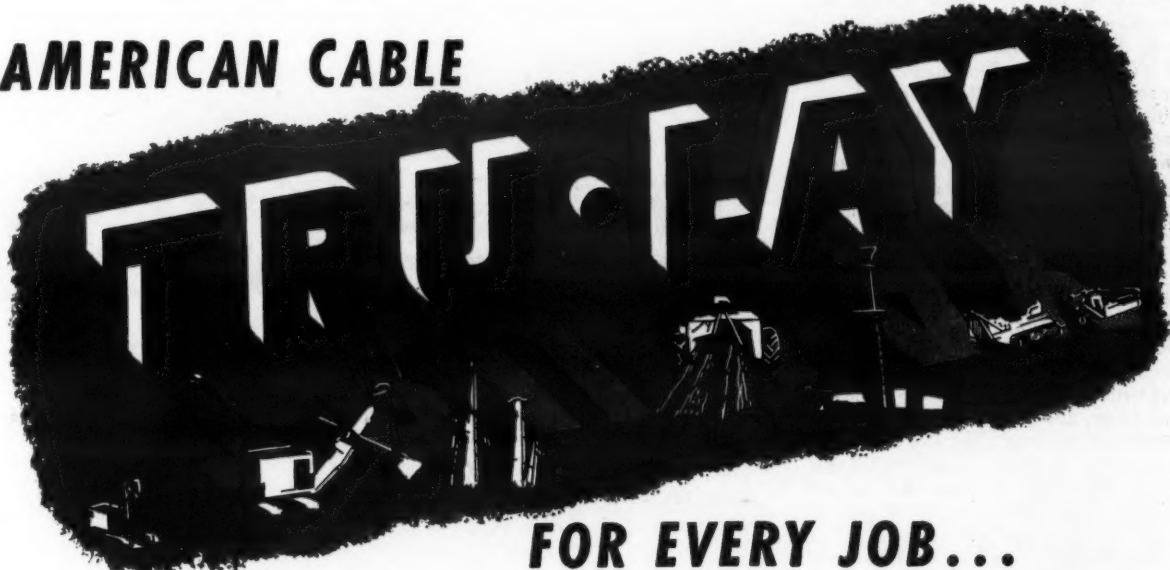
U. S. E. D. Photo

Falsework and forms for the reinforced-concrete girders supporting the roof of a flight hangar at an eastern Army airfield.

perintendent, and Paul Hess, Engineer. Dale A. Losey was Project Engineer and John H. Sewell, Assistant Project Engi-

neer, for the U. S. Engineer Department under Major J. J. Bernstein, Area Engineer, Western Area.

## AMERICAN CABLE



FOR EVERY JOB...

**TRU-LAY** Preformed saves time. Yes, this rope saves time—the most vital commodity in industry, the most important factor in winning the war.

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ESSENTIAL PRODUCTS... **TRU-LAY** Aircraft, Automotive, and Industrial Controls, **TRU-LOC** Aircraft Terminals, **AMERICAN CABLE** Wire Ropes, **TRU-STOP** Brakes, **AMERICAN** Chain, **WEED** Tire Chains, **ACCO** Malleable Castings, **CAMPBELL** Cutting Machines, **FORD** Hoists, Trolleys, **HAZARD** Wire Rope, **MANLEY** Auto Service Equipment, **MARYLAND** Bolts and Nuts, **OWEN** Springs, **PAGE** Fences, Shaped Wire, Welding Wire, **READING-PRATT & Cady** Valves, **READING** Steel Castings, **WRIGHT** Hoists, Cranes... *In Business for Your Safety*





A new portable unit to take light and power anywhere on the job.

### Light and Power Unit Is Readily Portable

Four models of the new portable Da-V-Lite unit for supplying light and power on construction jobs and for various types of emergency service are announced by the Davey Compressor Co., Kent, Ohio. For work over a large area, the Floodlight model, consisting of four 16-inch Westinghouse floodlights of 35,000 candlepower each, and with a potential height of 9 feet, is recommended. The Searchlight model is particularly adapted, the manufacturer states, for providing intense light on smaller areas or for projecting light a considerable distance. It is equipped with two 18-inch Westinghouse searchlights of 1,935,000 candlepower each, which may be increased through the use of special equipment to 3,225,000 candlepower per light. The Standard Combination model, with two 16-inch lights and two 18-inch lights, has the same control range and power as the previously mentioned models. The Beacon model, with one 24-inch 11,280,000-candlepower searchlight, is suggested for providing directional lighting at airfields or for emergency work.

The Da-V-Lite unit is equipped with a single-phase 60-cycle 120-volt Westinghouse generator, which delivers 5 kw for lighting or power and is operated by a heavy-duty four-cylinder V-type air-cooled engine. The power unit is enclosed in a sheet-steel weather-proof body. Two 30-ampere double receptacles for operating power tools are furnished. All models are available with either skid mounting or spring mounted on two wheels, but pneumatic tires are at present restricted to war orders.

Complete information and specifications on the Da-V-Lite light and power unit, which is distributed nationally by the Westinghouse Electric Supply Co., may be secured direct from the manufacturer.

### Testing Standards For Paving Materials

The Committee on Road and Paving Materials, D-4, at the Cincinnati meeting of the American Society for Testing Materials, acted on a proposed modification of the Abson test method for the heat extraction of asphaltic materials and the recovery of bitumen. This method involves a heat extraction procedure, centrifuging to remove the fine mineral matter, and a standardized distillation procedure using CO<sub>2</sub>, resulting in the recovery of relatively ash-free bitumen. For the past three years the committee has been investigating and studying the new method which, when issued as standard, will stipulate that the studies have applied only to asphaltic materials not softer than 150 penetration.

Tentative standards now to be adopted as standard by the committee include requirements for crushed stone and crushed slag for bituminous-macadam base and surface courses of pavements (D 693), and for crushed stone, crushed slag and gravel for water-bound macadam

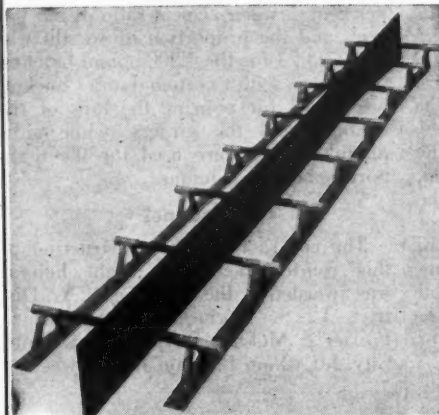
base and surface courses of pavements (D 694). Volume correction tables covering coal-tar patch (D 633), tentative since 1941, were recommended for adoption as standard. A subcommittee will study the rate of distillation and the type and size of apparatus used in testing the distillation of cut-back asphalts. (D 402).

### Canadian Distributor For Caterpillar Products

The appointment of Geo. W. Crothers, Ltd., Leaside, Toronto, Canada, as eastern Ontario distributor for the complete Caterpillar and Allied Equipment line of earth-moving and construction units has been announced by the Caterpillar Tractor Co., Peoria, Ill. The Caterpillar products include diesel track-type tractors, diesel high-speed rubber-tired earth-moving equipment, diesel motor graders, and diesel engines and electric sets. The Allied Equipment Manufacturers' products include those of LaPlant-Choate Mfg. Co., Inc., Athey Truss Wheel-Co., Willamette Hyster Co., Trackson Co., and the Killefer Mfg. Co.

For ease of assembly  
and speed of installation  
of expansion and contraction joints,

use **TRUS-ASSEMBLY**



It brings extra profits to the contractor by reducing installation costs to a minimum;

also saves the government money by eliminating maintenance expense caused by inaccurate alignment of dowels.

Write for circular

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PRODUCTS CO.**

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### INDEPENDENT CLUTCHES

Independent clutches is one of the greatest advantages a crane, shovel or dragline can have. LIMA cranes, shovels and draglines can hoist, swing, travel and boom up or down at the same time. Imagine the saving in time and convenience of such a feature when working in close quarters.

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Anti-friction bearings not only help to reduce friction and conserve fuel but they also keep shafts in proper alignment thus assuring a smoother running and longer lived machine.

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Big drums go a long way in prolonging cable life. Cable manufacturers recognize the injury to the cable if too small a drum is used. Therefore they recommend that drum diameters be not less than 30 times the diameter of the cable used. LIMA drums in most cases either meet or exceed these recommendations.

There are many good reasons why LIMA Cranes, Shovels and Draglines are doing such a fine job here and at the war front. They are rugged and strong, built to match whatever job there is to do. Independent clutches, big drums, anti-friction bearings and other modern features help keep the job moving at top speed.

Low cost operation, big output under adverse conditions and long dependable service assures complete satisfaction and pride in ownership. Consider these advantages when you plan your future excavating and material handling needs. Remember the name, LIMA, foremost in crane, shovel and dragline design.

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1/2 YARD TO 5 YARDS  
CAPACITY

**PULL-SHOVELS**

A TYPE AND SIZE FOR EVERY MATERIAL HANDLING JOB



# Ohio Road Program Well Planned Ahead

**Buckeye State Will Not Lose Time When War Ends; Planning Started Year Ago So Contracts Are Waiting**

WITHOUT waiting to see what the Federal government would do to finance planning of highways for construction when the war ends, Hal G. Sours, Director, Ohio Department of Highways, more than a year ago set up a division to study the highway needs of the state and make the necessary plans and contracts, ready for the release of construction materials for highways. The planning program was placed in charge of Murray D. Shaffer, Chief Engineer of Location and Design, whose first task was to find the men to do the work.

As a result of the large number of war industries in Ohio and the many men of draft age in the highway department, about 50 per cent of the personnel of the design offices was lost to the department. As the loss was equally great in the construction offices and field parties, it has been necessary to send design men out into the field in summer to complete the access-road program and then pull in men from the construction field offices for planning and design in winter. A few men coming back from war jobs each month, and some men returning from the front, are helping partially to offset the large number of Ohio's engineering personnel who are gradually leaving to enter the armed forces.

Just over a year ago the Ohio Department of Highways worked up a post-war construction program based on modernizing the entire state highway system, both rural and urban. It was found that this would cost the staggering sum of \$680,000,000 and would permit work on 12,000 miles of the system which totals 18,489 miles, broken down into 16,207 miles of rural highways and 2,282 miles of urban highways.

In order to bring the construction program within the realm of financial possibility, the problem was attacked from the standpoint of normal construction needs. This is work that should be done anyway to improve grades, alignment, eliminate grade crossings, replace failed pavement, including work that could be justified in a normal program of construction with true economy. This approach gave a program of \$465,000,000.

This still was beyond the financial power of the state to attempt so, from this volume of construction which could be justified economically, 125 needed projects were selected for immediate planning. This resulted in a program of \$22,000,000, for which the plans and contracts are now ready for letting. In addition to this, plans amounting to \$10,000,000 and from 80 to 90 per cent complete, are now in the Division offices for final details and checking. These could be made ready for letting in 60 days.

The advance engineering program of the Public Roads Administration, using Federal-Aid funds that had not been taken up by the states due to the war restrictions, has resulted in seven major projects in urban areas or on the strategic network in Ohio. These are in the intermediate report stage. When the plans are complete in from six months to two years, or an average of one year, these will add \$100,000,000 to the construction volume ready for contracts.

In addition to the programs above, the state has a post-war program amounting to another \$100,000,000 on which Ohio can finance the planning on a 50-50 basis with Federal-Aid funds for engineering.

## Financing

If Federal-Aid were available today, Ohio could put up \$10,000,000 for construction which, on a 50-50 basis, would produce \$20,000,000 of highway construction or, if the present bill in Congress sponsored by the AASHO is passed with the proposed ratio of 75-25, the \$10,000,000 available in Ohio would produce \$40,000,000 of construction.

The State of Ohio has a surplus of over \$74,000,000 in the state treasury, a portion of which could be expended for post-war highway construction if the state legislature so provided.

## The Ultimate

Mr. Shaffer stated at our interview that if there is no further loss in personnel, and if there is a slow but steady

increase in the number of men and women available to continue the necessary field and office work on the plans for highway construction, the Ohio Department of Highways will have a backlog of plans at the contract-letting stage amounting to \$60,000,000 in 1945. Since Ohio averaged a state-wide program of \$20,000,000 annually in the years preceding the war, this means that there will be ready to go a three-year normal

program, or an intensified program of two years, during which time, with a greatly increased staff in the Design Division, plans could be completed for a program to match any funds which were made available through Federal or state agencies.

*Gasoline and oil power the attack and are vital to Victory. Use yours wisely; don't waste them!*

## MONDIE DROP and UPSET FORGINGS

### FOR CONSTRUCTION EQUIPMENT

Such as Dipper Teeth, Trencher Teeth, Gear Blanks, Levers, Tie Rods, Cranks, Crank Shafts, Special Shapes, etc. Forging weight range from 1 to 50 pounds.

*Inquiries given prompt attention by our Engineering Dept.*

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**IT'S NOT SO EASY—**  
BUT EVEN IN THE DESERT, WITH THE HELP OF  
HERCULES CARGO BODIES, THE ARMY  
REPAIRS ITS EQUIPMENT



**HOW MUCH EASIER IT IS FOR YOU TO  
KEEP YOUR EQUIPMENT IN REPAIR!**

Don't neglect your Hercules Hydraulic Hoists and Bodies, or your Hercules Split-Shaft Power Take-offs.

Quick service on all Hercules parts is always maintained, and there's a Hercules Distributor with a well equipped Service Department near you.

**Hercules Steel Products Co.**  
GALION, OHIO





An airport grading plan of this type is helpful by showing the limits of work areas, the stationing on the runways and taxiways, and the amount of cut and fill in different areas. The stationing is helpful in computing the approximate acreage for each day's operations, and the amount of cut may indicate the amount of tillage which is required.

## Seeding Operations On Airport Projects

(Continued from page 35)

given heavier fertilizing and heavier seeding.

The rate of application in some measure determines the type of equipment to be used for distributing the fertilizer. The lighter the application, the more exacting are the requirements for the type of fertilizer spreader selected. Likewise, the lighter the application, the more accurate must be the rate of distribution. There are many types of fertilizer spreaders on the market, and it is wise to select a type which can be used for spreading both fertilizer and grass seed.

### Effect of Weather on Seeding

Weather always plays an important part in seeding operations. In the northern half of the United States, the optimum seeding season starts about August 15 to 20 and ends October 1 to 15. The length of the seeding period is determined by the latitude and by the kind of grass seed specified. (See "Some Typical Grasses for Turf on Airfields" by George B. Gordon, C. & E. M., Oct., 1942, page 54.) For example, Kentucky bluegrass seldom germinates before 14 to 21 days and in its northern ranges should be planted only from August 15 to October 1, as it does not become sufficiently well established to withstand winter conditions if seeded after the first of October. In the southern range of the bluegrass area, the limits of the seeding period may be much longer. On the other hand, red top germinates in from 6 to 10 days and the period is shortened by cold nights and warm days. Consequently it may be seeded as late as October 15 and still become sufficiently well established to carry through the winter. Therefore, the seeding mixture specified will determine the limits of the seeding period. The rainy season also will determine, in part, the intensity of seeding operations, and usually at this season of the year one must count on a 10 to 15 per cent loss of time due to the seasonal rains.

The direction of the wind is also a factor, which will determine the dominant direction of the seeding. Sometimes the wind is so gusty that seeding operations must be limited to early morning and late afternoon and evening. The "windrose" on most airport maps will help in determining the optimum directions for seeding operations. It must be remembered that most specifications call for two-way seeding, the sec-

ond seeding at right angles to the first.

### Grass-Seed Mixtures

Perhaps in no other field of knowledge are there greater differences of opinion than in writing specifications for grass-seed mixtures, where different kinds of turf are required. It must be kept in mind by those planning airports and those supervising their construction that airports are not pasture or hay land, nor should they be treated as fairways and "rough" of golf courses. The grass is kept much longer, 6 to 8 inches, in airport maintenance; it is never cropped as close as on fairways or hay lands or pastures. Close cropping reduces the length of root development materially, and endangers the healthy condition of the grass during drought periods.

The specifications for grass-seed mixtures usually state required percentages of purity and germination. These should be carefully scrutinized by the contractor when he secures cost figures on the seed. Very often a low percentage of

(Concluded on next page)



LOOKING  
AHEAD?

Include

**TUTHILL GUARD RAILS**

in Your Plans

HIGHWAY ENGINEERS are now making plans for their post-war safety program. Many of them, knowing by reputation and service the TUTHILL GUARD RAIL, are including it in their post-war specifications.

Unique in its convex design and spring-like deflective action, substantial, strong and attractive, easy to install and maintain, TUTHILL is the logical Guard Rail to specify now for use later.

Pacific Coast Manufacturers and Distributors  
**U.S. SPRING & BUMPER CO., LOS ANGELES, CAL.**

Write for  
detailed  
specifications.

**TUTHILL SPRING COMPANY**  
762 POLK ST... CHICAGO 7, ILL.



## MOTHER EARTH IS GOING TO HAVE HER FACE LIFTED!

SOUNDS like a rather ambitious undertaking, doesn't it, but that is more or less what is going to happen after this World Struggle is over. The Earth is in for a tremendous resurfacing operation.

The construction, road building and grading jobs for Crawler type tractors in that not too distant period are colossal. While our Plant is now engaged in essential work for the Armed Forces, we are not forgetting for a moment our duty and obligation to those who depend on Rodgers presses for quick repair of crawler tracks and other heavy machinery. Right now, all engaged in essential work are eligible for Rodgers Hydraulic Track and Universal Presses. Wire or write for full information and prices. If it's a Rodgers, it's the best in Hydraulics. Rodgers Hydraulic Inc., St. Louis Park, Minneapolis 16, Minnesota.



### Manufacturers of:

UNIVERSAL HYDRAULIC PRESSES  
TRACK PRESS EQUIPMENT  
HYDRAULIC KEEL BENDERS  
HYDROSTATIC TEST UNITS  
POWER TRACK WRENCHES  
HYDRAULIC PLASTIC PRESSES  
PORTABLE STRAIGHTENER  
FOR PIPE AND KELLYS

**Rodgers HYDRAULIC Inc.**



## Seeding Costs Should Be Carefully Studied

(Continued from preceding page)

germination and purity is specified, so that the seed dealer may furnish grass seed at a lower price than those prevailing for farm use. In such cases, the rate of seeding is often increased, or the percentage of a particular grass used in the mixture is changed to offset these deviations from Federal or state specifications.

### Cost Data

The factors determining the cost of seeding operations are as follows:

1. **Cost of Material.** This includes lime, fertilizer and grass seed. Lime is very variable in cost, depending on its availability near the site. In some localities, lime may be purchased for \$1.75 a ton, delivered and spread, while in other regions prices may be as high as \$6 to \$7 a ton. Fertilizer costs depend entirely upon the composition, with current prices ranging from \$20 to \$60 a ton. The cost of grass seed is likewise determined by composition. Bent, Canadian bluegrass, and certain legumes are comparatively high, ranging from 50 cents to \$1 a pound. Additional costs of bacterial inoculation of the soil should always be added for leguminous seeds, as clover, alfalfa and vetch each needs its own inoculation. Nurse crops, such as rye and oats, vary widely, with current prices approximately \$1.25 to \$1.50 a bushel.

2. **Equipment Rental.** This must usually be determined by the existing OPA rates. It is usually difficult to rent tractors from farmers, because airport seeding generally conflicts with farm operations requiring tractors. Often, the smaller equipment at least had best be purchased.

3. **Personnel.** The cost of personnel is determined entirely by the wage scale established in the contract. One item of cost frequently overlooked in seeding is the idle-time element. During the spring and often during September, a good deal of rain may be anticipated. South of the Mason-Dixon line, these rainy seasons are more pronounced, and consequently can be more accurately anticipated. However, because of the shortness of the seeding season, loss of time due to bad weather must be made up and labor costs for seeding operations usually run high because of the great amount of overtime required for this intensive work.

4. **Equipment Operating Costs and Repairs.** The upkeep cost for farm equipment is fairly high, due to the speed at which this type of equipment is run, and the long hours of intensive work involved. This is especially true unless unusually well-built equipment is available for this work. Tire maintenance also is high, especially if synthetic-rubber tires are used. All of these costs vary considerably with the nature of the soil and the amount of foreign materials which may be present. On one airport, where broken cable and conduit had not been carefully removed, there was unusually heavy damage to tires and equipment. As to the cost of fuel, fuel consumption by tractors varies tremendously. Gasoline consumption may run as high as 2 gallons an acre, with 1 1/4 gallons an acre a fair average.

The accompanying tables give the costs for an airport located in sandy loam soil, where the specifications called for 300 pounds of 6-12-4 fertilizer per acre, 2 tons of lime, 25 pounds of grass seed, and 45 pounds of winter rye.

COST PER ACRE OF MATERIALS  
Delivered on Site

Lime	\$3.50
Fertilizer	6.60
Grass seed	6.80
Inoculation material	.10
Winter rye	1.40

In order to understand the wide spread

### Comparative Bids for a Seeding Project

Item	Engineer's Estimate	Agronomist's Estimates		Letting Bid	Four Other Bids			
		45-day Completion*	30-day Completion					
Fertilizing	\$10.00	\$14.75	\$16.60	\$10.00	\$16.00	\$12.00	\$12.00	\$16.58
Liming	8.00	6.60	7.40	9.00	11.00	11.00	5.00	7.02
Seeding rye	7.00	4.07	4.60	3.00	7.00	5.00	10.00	5.59
Seeding grass	10.00	15.70	17.75	9.00	7.00	15.00	14.00	23.53
Total	\$35.00	\$41.12	\$46.35	\$31.00	\$41.00	\$43.00	\$41.00	\$52.72

\*—Without overtime. The Agronomist's estimates shown were made by a consultant for the contractor after the latter realized that his bid figure was too low.

of some of these items, careful analysis reveals the following. Where fertilizing and liming operations are separated, the operation of disking and harrowing may be charged partly to both. In other cases, the preparation of the soil is charged entirely to fertilizing and grass-seeding operations. Analysis of the cost of material will always help in a detailed analysis of tables such as those given. Ultimately, it is the per-acre cost in which we are interested.

### Conclusion

Contractors and engineers who are successfully adjusting themselves to the kaleidoscopic changes of the future recognize that the construction of airports as well as Flight Strips connected with

highways will have an important place in post-war work. The number of airports now under construction and those being planned by various Federal agencies is on the increase. Many others are being planned by cities, counties and states. On smaller airports, the runways and taxiways will be seeded rather than surfaced.

In view of these conditions, it is well to consider some of the values inherent in seeding operations from the contractor's point of view. Nothing adds so much to that intangible asset of good will of the contracting party, as well as the public acceptance, as the finishing touches of a good seeding job. From the point of view of airport maintenance, failure to establish a good turf is cer-

tain to result in serious damage to the most carefully constructed drainage system, and from the standpoint of economy in engine care and safety, nothing contributes so much to the elimination of dust and dust hazards at airports as careful attention to the details of a well-planned and executed seeding program.

### Duffy New Sales Manager For Irving Grating Co.

The appointment of Joseph Duffy to the position of Sales Manager has been announced by the Irving Subway Grating Co., Long Island City, N. Y. Mr. Duffy, who has been acting in a sales capacity for the Irving firm for the past two years, will direct a large sales force from both the New York and West Coast divisions of the company and with representatives in every state. The Irving concern, the first to develop the emergency airplane landing mat for battlefronts, is now experimenting with steel grating for highways and with rooftop landing mats for post-war helicopters.

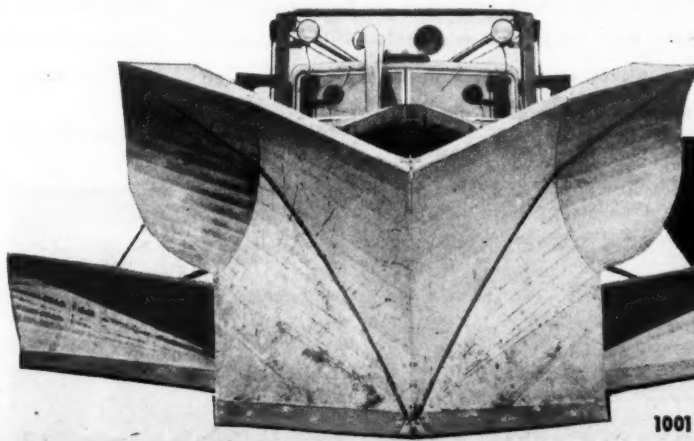


## NOW is the time to Select Equipment for Next Winter's Snow Removal

Experienced highway maintenance men know that you can't put snow removal into a neat package in early Spring and label it "Do not open until Fall!"

They know that many phases of snow removal are best planned in the off-season, when the past winter's experience can be studied—operating techniques re-examined—equipment checked. Above all, they realize that specialized snow removal equipment—vital to winter highway maintenance—must be evaluated, ordered and produced months before the first snow falls.

It's easy (and often too late) to recognize the dangers of traffic tie-ups when snow is piled deep on your highways. But it's a lot safer to take steps NOW to insure readiness for the severest conditions next winter.



### Important Advantages of WALTER 250 H. P. SNOW FIGHTER

- Clears a 28 ft. width in one run—has rugged power to smash through road-blocking drifts, plus speed to clear more miles per hour.
- Throws snow far to the side—makes widening-out easier.
- Does not waste power in slipping, stalling or wheel-spinning, because the exclusive Walter 4-Point Positive Drive delivers power to each of FOUR driving wheels according to its traction at any instant.
- By clearing main highways faster, you gain extra time for opening more miles of secondary roads.

WRITE TODAY for detailed literature.

# WALTER

## SNOW FIGHTERS

WALTER MOTOR TRUCK CO.

1001-19 IRVING AVE., RIDGEWOOD 27, QUEENS, L. I., N. Y.





The new reinforcing bar recently developed by Inland Steel Co.

### New Reinforcing Bar With Improved Bond

A new type of concrete reinforcing bar designed to give greater bonding value between concrete and steel has been announced by Inland Steel Co., 38 So. Dearborn St., Chicago 3, Ill. Inland engineers feel that this new Hi-Bond bar will lead to revisions of existing building codes and in the design of reinforced-concrete structures to take advantage of the greater bond strength, thereby resulting in more efficient structures through conservation of materials and labor.

The Inland Hi-Bond reinforcing bar increases the effectiveness of reinforcing steel in concrete through the improved load transfer made possible by the design. This is accomplished by reversed double helical ribs of carefully designed height, which extend between diametrically opposed longitudinal ribs. The helical ribs are spaced at close intervals and are so dimensioned as to provide potential bearing and shearing areas which, in addition to having the proper relationship to each other, are carefully proportioned to the effective strength of the bar. The bearing area is reported to be more than double that of usual commercial types of reinforcing bars.

Complete information on dimensions and availability may be secured direct from the manufacturer.

### New Steel Structures On Post-War Roads

According to reports received from 42 states by the American Institute of Steel Construction covering the steel requirements for bridges in all states except Arkansas, Illinois, New Mexico, Rhode Island, South Dakota, and Tennessee, as proposed under the Federal-Aid highway program, a grand total of 999,125 tons of fabricated structural steel will be required. This tonnage is distributed as follows:

Ala.	10,000	Nebr.	29,000
Ariz.	3,500	Nev.	1,750
Ark.	—	N. H.	7,500
Calif.	35,000	N. J.	30,000
Colo.	37,500	N. Mex.	—
Conn.	14,525	N. Y.	264,975
Del.	6,000	N. C.	10,000
Fla.	12,000	N. D.	7,000
Ga.	16,250	Ohio	25,000
Idaho	2,400	Okl.	14,000
Ill.	—	Ore.	4,625
Ind.	30,000	Pa.	50,000
Iowa	4,210	R. I.	—
Kans.	27,000	S. C.	7,000
Ky.	20,000	S. D.	—
La.	15,000	Tenn.	—
Maine	6,200	Texas	10,000
Md.	59,000	Utah	4,000
Mass.	6,500	Vt.	1,500
Mich.	34,440	Va.	16,500
Minn.	30,000	Wash.	30,000
Miss.	47,500	W. Va.	5,000
Mo.	30,000	Wisc.	1,750
Mont.	25,000	Wyo.	2,500
D. C., 17,000			

### New Goodrich Catalog On Wire-Grommet V-Belts

A four-page folder, describing and illustrating several types of V-belts, and featuring the recently-developed wire-grommet V-belt, has been prepared by

the B. F. Goodrich Co. The wire grommet construction, formed by twisting high-grade steel wire on itself to form an endless loop of great power-carrying strength, eliminates the possibility of weak spots in the belt resulting from splices or overlapping. Balanced construction keeps the wire grommets a uniform distance from the sides of the belt throughout its entire length, and high tensile strength and resiliency to resist shock, combined with very little permanent stretch, allow increased horsepower ratings. These belts are available in standard sections, 105 inches and longer. Production is limited at present, but on projects where standard belting cannot be used, and wire-grommet belts are suitable, the manufacturer will furnish them within the limits of production capacity.

Other belts described are cotton-cord belts, employing the grommet-type construction, fractional horsepower V-belts, and multi-V-belts.

Copies of this folder will be sent by the B. F. Goodrich Co., Akron, Ohio.

## CONNERY'S HEATING KETTLES



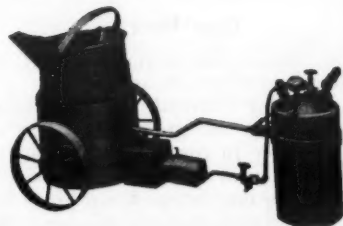
Send today for our complete catalog showing our full line of Tar and Asphalt Heating Kettles, Spraying Attachments, Pouring Pots, etc.

**CONNERY CONSTRUCTION CO.**

4000 N. Second St.

Philadelphia 40, Pa.

Speed up work by using a Connery Heating Kettle for building and maintaining highways, airports, barracks and roads. Made in sizes of 30, 80, 110 and 165 gallons.



## MARION'S Job After Victory

### Raw Materials For the Better Things in Life

Postwar developments recognize as fundamental to progress such basic raw materials as iron, copper, bauxite, nickel, etc., which MARION shovels pioneered years ago and have been digging on full twenty-four hour schedules

since we went to war. MARION will continue to wield a powerful influence in producing these materials, economically and in needed quantity, so that all of us may

share the better things in life after Victory is ours.

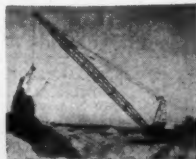
MARION is prepared to help you with your postwar plans.



CRANES • PULL-SHOVELS  
CLAMSHELLS • SHOVELS  
DRAGLINES • WALKERS

For Every Material  
Handling Job  
3/4 cu. yd. to 35 cu. yds.

BUY WAR BONDS



THE MARION STEAM SHOVEL

COMPANY • MARION • OHIO



# Care of Equipment In Allegheny County

**County Works Department  
Has Bureau for Each Activity;  
Care of Trucks and Heavy  
Equipment Divided**

(Photos on page 80)

♦ THE Allegheny County, Pennsylvania, Department of Works is departmentalized to place responsibility for each activity under a Bureau head. These Bureaus are: Projects, Surveys and Construction; Design; Maintenance; and Tests; and are supplemented by the General Office which includes the Divisions of Contracts, Accounts, and Photography. The Bureau of Maintenance is also subdivided into separate Divisions covering Road Maintenance, Bridge Maintenance, Tunnel Maintenance, Traffic, and Landscape.

The County plan of organization places the repair of light maintenance equipment, such as passenger cars, survey corps buses and trucks, under the Bureau of Motor Vehicles which is part of the Department of Property and Supplies. The Bureau of Maintenance of the Works Department, at its six district warehouses, repairs heavy equipment, such as power shovels, graders, rollers, cranes, tractors, etc. This Bureau also has two district warehouses used as headquarters for Bridge Maintenance.

Each of the six district maintenance warehouses has a shop to take care of ordinary minor repairs for all of its equipment, while the major overhaul of trucks is done exclusively at the South Side Garage of the Bureau of Motor Vehicles at Pittsburgh. The Blawnox District No. 2 Warehouse of the Bureau of Maintenance is the central overhaul depot for all heavy maintenance equipment.

A General Supervisor of heavy equipment keeps moving around the county, checking the condition of equipment. Should any machine need either minor or major overhaul, it is his responsibility to see that it is taken to the proper shop for this work. The District Foreman in each district warehouse checks equipment for lubrication, while the operators

in their daily reports of work done indicate any needs for adjustment or maintenance of the equipment which they cannot do themselves.

## District No. 2 Warehouse

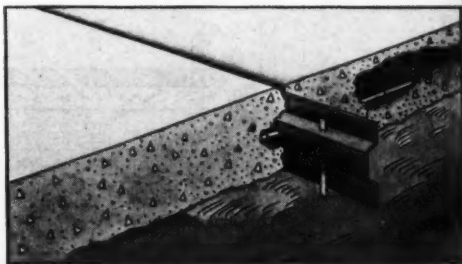
District No. 2 warehouse at Blawnox, Pa., is a modern rectangular structure 120 x 235 feet in plan, built of structural steel with brick facing, with a concrete-slab roof surfaced with composition roofing carried on steel trusses. Exceptionally good lighting is provided by continuous windows at the two ends and the front of the shop and over each of the five large doors at the rear. Each window is separately opened and closed by hand cranks. The five overhead doors permit openings 15 feet square for the entrance of the largest equipment to the



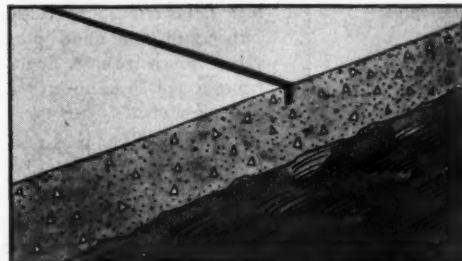
The rear service entrance to the District 2 shop and warehouse of Allegheny County.

garage proper. This open section of the floor of the garage is a 6-inch concrete (Continued on page 74)

## KEYSTONE PAVING JOINTS FOR EVERY JOB—TO FIT ANY BUDGET!

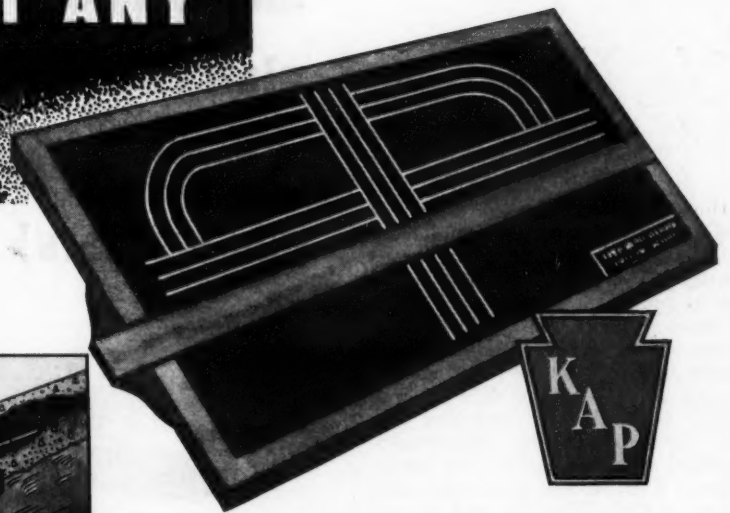


**TONGUE AND GROOVE CENTER STRIP**—a pre-moulded asphalt mastic board keyed-joint—an exclusive Keystone development that guarantees maximum load transmission.



**KEYSTONE DUMMY JOINTS**—for the job where cost must be kept down—give accurate, straight alignments and eliminate use of expensive installing equipment.

**AVAILABLE FOR PROMPT SHIPMENT**—a complete, nationally known and proven line of pre-moulded tongue and groove joints, dummy joints, asphalt joints, fibre joints and accessories, joint-sealing compounds and crack filler. Write for catalog and descriptive materials today.



You'll have no costly delays on the job due to shipments of various materials not arriving together if you standardize on Keystone paving joints and accessories. Keystone, a leading paving joint manufacturer, offers a complete line of equipment and nationally accepted joints to fit every budget and will save you time, money and inconvenience by making complete shipments from one source available to you.

Whenever you have a paving problem or question on materials, take advantage of Keystone's free technical and advisory service. There's no obligation.

## CUMMER ASPHALT PLANTS

EIGHT SIZES

Up to 1000 Tons per day

DRYERS

Two-Fire and Internal  
Fire

30 to 100 Tons per hour

Electric Batch Timers

50 Years' Experience

THE F. D. CUMMER & SON CO.

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ASPHALT PRODUCTS CO.  
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MANUFACTURING PLANT • CHICAGO HEIGHTS, ILL.

PREMOULDED ASPHALT AND FIBRE EXPANSION JOINTS AND ACCESSORIES.  
JOINT SEALING COMPOUNDS AND CRACK FILLERS



## Upkeep of Equipment For Road Maintenance

(Continued from page 37)

ber of years, was very instrumental in reducing these annual payments down to about \$30,000. Many employees, in fact 265 of them, have been operating equipment in the Highway Department for twelve years without having had an accident. Insurance which protects the state against accidents occurring incident to the operation of all state-owned equipment is carried at a cost of only 70 cents per man per month. It is felt that the educational program and the safety awards have contributed much to the reduction in accident costs and in the insurance rate.

### Maintenance Equipment

In Minnesota all upkeep of maintenance equipment is handled by the maintenance division and, according to Mr. Motl, this arrangement has worked most satisfactorily. While he agrees that in many states a separate department may handle this phase of operations with some advantages, he believes that it is rightly a function of the using agency.

State-owned equipment operated and serviced by the maintenance department includes the following:

300 Trucks
8 Tractors, crawler
9 Tractors, wheel
161 Motor graders
235 Passenger cars
59 Motorcycles
200 Pull graders
777 Snow plows
367 Snow wings
299 Spreaders, sand
365 Mowers
79 Mixers
162 Tar kettles
268 Miscellaneous bituminous equipment
401 Miscellaneous equipment

Hourly rental charges have been established for most pieces of equipment, although passenger cars and light trucks are charged on a mileage basis and some special equipment on a daily, monthly or even annual basis. This rental charge, which has been established by studies and investigations covering a period of 20 years, rather than set arbitrarily, is sufficient to cover first cost, depreciation, fuel, lubricants, repairs, overhead and all other items except operators. Each piece of major equipment carries a Servis Recorder and charges for use are based on actual "operating hours". Money so charged against maintenance operations is placed in a revolving fund from which all equipment, fuel and lubricant purchases are made and against which shop operation is charged.

Depreciation charges are figured on a system somewhat different from that in general use. According to Mr. Motl, there does not seem to be much logic in using the year as a basis of computing depreciation, when all other determinations, such as operating costs, rental, etc., are made on an hourly basis. Therefore Minnesota has adopted an hour multiple of 1,000 as a basis of computing depreciation; and, in addition to this, per-cent depreciation for each succeeding 1,000 hours of use is gradually reduced. This results in charging off high depreciation while the equipment is new, and less depreciation as the equipment gets older and is in need of more extensive repairs. Based on the cost of equipment as delivered and made ready for use, Minnesota depreciation charges are made as follows:

Period of Operation	Percentage of Cost To Be Charged to Depreciation
0,000 to 1,000 hours	20
1,001 to 2,000 hours	15
2,001 to 3,000 hours	15
3,001 to 4,000 hours	10
4,001 to 5,000 hours	10
5,001 to 6,000 hours	5
6,001 to 7,000 hours	5
7,001 to 8,000 hours	5
8,001 to 9,000 hours	5

Under this procedure 50 per cent of the cost is charged off in the first 3,000 hours of operation and 70 per cent in

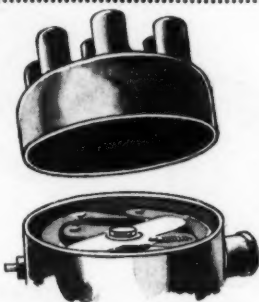
the first 5,000. After 9,000 hours no further charge is made for depreciation as it is felt that the equipment will continue to have a value of at least 10 per cent, for junk if for no other purpose. Incidentally, Minnesota's depreciation rate is approximately a constant 20 per cent throughout the life of equipment when computed on the basis of equipment value at the time the depreciation is applied.

Repairs to equipment are made in the sixteen district shops located in Virginia, Duluth, Bemidji, Crookston, Brainerd, St. Cloud, Detroit Lakes, Morris, Hopkins, St. Paul Park, Rochester, Owatonna, Mankato, Windom, Willmar and Marshall, and in the central shop in Saint Paul. Equipment, when not in use, is housed at these district shops or in conveniently located storage garages throughout the state.

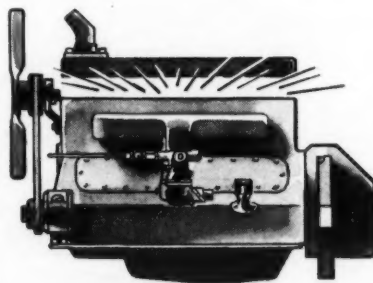
Equipment purchases are made on competitive bids based on specifications broad enough to include more than one manufacturer. Remarkable economies

(Continued on next page)

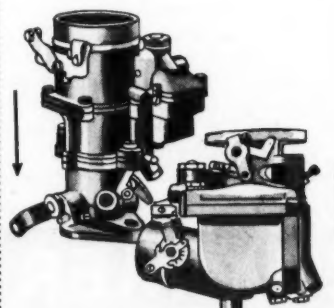
## Make sure your preventive maintenance plan checks these possible gas-wasters!



**Worn distributor points and improper timing** may not be serious enough to stall a truck, but they can still cause excessive gas consumption. Be sure these items get more than a "look and a promise" when preventive maintenance work is being done.



**Idling engines waste gasoline.** Worse than that, engines literally "idle their heads off." Idling causes carbon formation, fouled plugs and valves, which requires frequent removal and cleaning of cylinder heads.



**High carburetor float levels** have often been found to cause excessive gasoline consumption. Even a small amount of wear on float linkage and needle valve changes the carburetor adjustment.

**To get the last mile from every gallon of gas**—In the big job of saving irreplaceable equipment, scarce tires, parts and labor, don't lose sight of the important part your p. m. plan can play in gasoline saving. It's doubly important now—it's a contribution to the war effort—it may mean the difference between a profitable and unprofitable year for you.

Make sure your p. m. plan includes the steps listed here to help get the last mile from every gallon of gasoline you use. Standard Automotive Engineers have other suggestions—

and modern testing instruments as well—for locating possible sources of gasoline saving in your fleet. Ask the Standard Oil Man who calls on you about this Automotive Engineering Service. It is available to all fleet operators in the Middle West. Or write the Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois for the Engineer nearest you. In Nebraska, write Standard Oil Company of Nebraska at Omaha 2.

*Gasoline Powers the Attack—Don't Waste a Drop!*

## STANDARD OIL COMPANY (INDIANA)

STANDARD SERVICE

★ FLEET CONSERVATION SERVICE

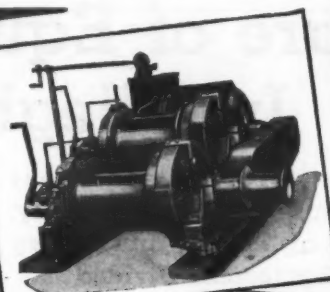
## Hoists to Fit the Job

Lidgerwood hoists have earned a 70-year reputation for dependability and efficiency on the job. There's a Lidgerwood gasoline, steam, electric or Diesel hoist to fit every construction need. When you need a hoist inquire first of LIDGERWOOD.



## LIDGERWOOD

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Manufacturing Company  
MAIN OFFICE AND WORKS • ELIZABETH, NEW JERSEY



**HOISTS FOR:**  
CABLEWAYS  
INDUSTRIAL PLANTS  
CONTRACTORS  
MINES—DOCKS  
RAILWAYS



## Minnesota Maintenance Of Highways in Wartime

(Continued from preceding page)

have been obtained in purchase of equipment by this method.

### Maintenance During War

Reduction in the amount of normal maintenance has been necessary during the war, in Minnesota as well as in other states; however, no reduction has been possible in the cost of snow removal and ice control. Costs of this work have even increased slightly due to the difficulty of securing repair parts and the resulting necessity of heavier than usual repairs. Expenditures for new equipment have of necessity been materially reduced and the normal program of building construction and improvement has been curtailed. This is creating a serious situation which will be remedied as soon as possible.

Reduced use of the highways has somewhat lessened the need for addition of gravel and reconstruction of low-type bituminous surfaces. This work is ordinarily done largely by contracting the production and placing of gravel on the road as well as the application of bituminous materials. After application by contract, the gravel and bituminous materials are ordinarily mixed by state forces using power graders and retread pavers and compacted by rubber-tired traffic rollers and three-wheel power rollers. Only 6,100,000 gallons of bituminous materials were applied in 1943, while in 1940, this figure was 12,600,000 gallons.

Where occasional blow-ups occur on concrete pavements, state forces repair the damage by cutting away the broken concrete with air hammers, usually for a minimum distance of 6 feet, setting a standard transverse expansion joint in the center of the gap, and then filling in with concrete mixed at the site in 2-bag mixers.

Prior to the war, a program of flattening slopes, thereby eliminating the need for a considerable mileage of guard rail and snow fence, had been instituted, but this program has been almost entirely postponed as has all but the most necessary repairs and replacement of the 125,000 highway signs on the Minnesota trunk highway system.

The small amount of new construction done has eliminated the need for detours and this has contributed to a reduction in the total expenditures of the maintenance department, although this same lack of normal construction has necessitated maintenance operations where reconstruction might have been more economical. However, much of the heaviest maintenance expense is occasioned by frost damage on roads graded prior to the use of soil selection in construction work and on which the surfacing consists of a few inches of gravel and a light bituminous mat. This type of road will be reconstructed to modern standards as fast as conditions will permit, with preference being given in this construction program to the roads of greatest importance.

Spring-time thawing of culverts remains a troublesome and expensive item of maintenance regardless of the war. State forces do this work, using a tank-car heater pulled by a flat truck carrying two barrels of fuel oil and a water tank. Steam is conducted through hose and ½-inch pipe nozzles which are used to open the clogged culverts. In large culverts, the ice is cut into rectangular chunks, weighing 400 to 600 pounds, which can be slid out of the culverts and handled with ice tongs in less time than would be required to melt all the ice.

Normal replacement of small quantities of shoulder gravel is usually done by state forces. Suitable gravel is gen-

erally obtainable nearby, although in some cases gravel which has better stabilizing qualities and can be purchased elsewhere more cheaply is hauled from some distance. Even though the total cost for a small amount of gravel is thereby increased, this is considered more economical than to establish the precedent of paying high prices for gravel which can be obtained with less haul. This policy has resulted in a stabilization of the price for local gravel at from 4 to 10 cents per cubic yard.

An interesting job of resurfacing under traffic was done during 1943 on Trunk Highway 51 near Saint Paul where it became necessary to reinforce certain sections of the existing bituminous pavement as well as to provide some connections and crossovers to a construction contract. Approximately 5½ per cent of RT-6 tar was mixed with washed sand and gravel from a nearby commercial plant, using motor graders for mixing on a nearby service drive approximately half a mile long. The mixed material was then loaded into

dump trucks by an Austin-Western 99 grader with a rear-end loader attachment, dumped on the road at the rate of about 500 cubic yards per mile, and

immediately spread by motor graders and rolled by power rollers without interruption to traffic.

(Concluded on page 73)

# TORO

## Power Mowers



### TORO MANUFACTURING CORP'N.

MINNEAPOLIS, MINN.

MOWING MACHINERY SPECIALISTS FOR OVER 20 YEARS

**SOMETHING NEW  
IN ROAD MAINTENANCE**

# PROJECTIVE MAINTENANCE

for lasting benefits

from subsoil to surface  
with **CALCIUM CHLORIDE**

**Write for this  
New Bulletin**

This Bulletin shows how maintenance can combat wartime road deterioration and provide a better foundation for postwar highways. It is full of helpful suggestions on materials and methods and is mailed on request.

**CALCIUM CHLORIDE ASSOCIATION • 4145 Penobscot Building, • Detroit 26, Mich.**



## Scenic Route Planned Along Mississippi River

Seven of Bordering States Have Passed Enabling Acts: Project To Be Presented to Congress

PLANS are again being discussed and actively promoted for a national parkway and highway along the Mississippi River, from its source in Minnesota to the Gulf Coast. Realization of these plans will enable the post-war automobile traveler to drive along the course of the Mississippi on a continuous highway of great historic interest and natural beauty. It is proposed to utilize existing roads where possible, widening and improving them and incorporating them with the new highway, which will keep as close as possible to the river, crossing and recrossing it to include points of special interest to tourists. It is hoped eventually to connect the Mississippi Parkway and Highway with the Alaska Highway by means of scenic routes through Canada.

### Idea Not New

The idea of such a route along the Mississippi River was first advanced seven years ago, and an act of June 23, 1936, authorized the Secretary of the Interior to make a comprehensive study of the parkway in cooperation with the bordering states, Minnesota, Wisconsin, Iowa, Illinois, Kansas, Missouri, Tennessee, Arkansas, Mississippi and Louisiana, but the war emergency made it necessary to put aside the project. Now that post-war planning and blueprinting are being encouraged, and in view of the request by Congress to the Public Roads Administration for recommendations for post-war continental highways, the Mississippi River Parkway Planning Committee has drawn up a proposed Congressional Act, adapted from a 1939 measure reported favorably by the Committee on Public Land and Surveys of the House, to be introduced as soon as practical into the present Congress.

### Proposed Plan

The proposed Congressional Act would authorize the Secretary of the Interior to make the necessary surveys and plans, and to accept from the bordering states such lands, waterways, et cetera, as he may consider desirable for parkway purposes. The parkway and highway are to be jointly planned, constructed, maintained and administered by the Secretary through the National Park Service and the Federal Works Administrator through the Public Roads Administration at the expense of the United States.

In addition to acquiring and conveying to the United States lands, easements and other property for parkway purposes, the states will cooperate in the following obligations: constructing or reconstructing fencing along parkway area boundaries; providing cattle passes, changing or removing overhead wires, constructing underground wire and pipe crossings on line, reconstructing public and private roads, making land and topographic surveys, providing and setting permanent land-boundary markers, and conducting condemnation proceedings and easements necessary for the construction and maintenance of the highway by the Federal Government. They will also arrange for the relocation or abandonment of portions of railroads, subject to the jurisdiction of the Interstate Commerce Commission and the state public service commissions, when such action will facilitate parkway construction and will not interfere with flood-control projects; and will authorize immediate payment for timber standing on the parkway route, to discourage cutting pending final purchase. It is also

provided that the bordering states shall authorize the leasing of property acquired for parkway purposes on terms satisfactory to the Secretary during the period of negotiations, from the time the property is acquired by the state until the time it is transferred to the United States. Costs incurred in all of these transactions shall be apportioned between the states and the United States as Congress may from time to time hereafter provide.

### Standards of Design

Design and construction standards as stated in the proposed Congressional Act designate a parkway area of 100 acres per mile, plus parkway easements of 50 acres per mile, averaged over the gross length of the main parkway route in any one state, and a main parkway-area minimum width of 200 feet. Parkway-area boundaries need not be a uniform distance from the center line of the parkway road, as the variations in width will be dependent upon the topographic and other natural conditions, requirements of design, easements, and time and cost of acquisition. The Act prohibits the dumping of ashes, trash, sawdust or any other unsightly offensive material upon the parkway and stipulates that the use of signs, billboards or advertisements shall be limited by zoning and other restrictions. Federal, state and local authorities will cooperate in the enforcement of all laws and regulations pertaining to the parkway or connecting links. The states and their political subdivisions shall reserve the authority to levy and collect taxes on all motor-vehicle fuel and lubricants and other products or services sold within the parkway, except on sales to and for the exclusive use of the Federal government.

Seven of the ten bordering states have already passed Parkway Enabling Acts, and the remaining three have approved joint resolutions favoring the Parkway. All have cooperated with the Mississippi River Parkway Planning Committee in developing a plan for this national parkway which, it is felt, is deserved by the 30,000,000 midcontinent people in these states who now have no national highway or recreation area.

### N. J. Highway Users Ask Motor Fund Protection

Organizations of New Jersey highway users, at a hearing on revision of the State Constitution, recently advocated constitutional protection of special motor vehicle taxes, to assure their being used only for highway purposes. Those favoring such protection (already in effect in fourteen states) include: former State Senator David A. Agans, Master, N. J. State Grange; Mrs. Kathryn D. Sullivan, N. J. Conference of Automobile Clubs; Alta R. Ely, Manager of the Automobile Legal Association; W. J. Gaffney, Secretary of the N. J. Petroleum Industries Committee; William L. Mallon, Executive Secretary of the N. J. Automotive Trade Association; Herbert Voorhees, President of the N. J. Farm Bureau; D. J. Crecca, Manager of the N. J. Motor Truck Association; and Jacob Spiegel, President of the N. J. Association of Township Committeemen.

### Electric Vibrators For Hoppers and Chutes

Seven sizes of vibrators for use on bins, hoppers and chutes are presented in a recent catalog from Syntrol. Each model delivers 3,600 vibrations per minute, and is equipped with a controller rheostat to control the impact to the proper amount of vibration required. The small Models V-9 and V-15 are described as noiseless in operation, and are recommended for removing fines from return conveyor belts, to vibrate small testing tubes in laboratory analysis, and for small hoppers of capacities up to 2 cubic feet and 7 cubic feet re-

spectively. Models V-25 and 55, the larger "impact" types, whose high-speed percussive impacts may be toned down by the controller rheostat to the proper amount of vibration, are adaptable to large cement bins, hoppers and chutes. The heavy-duty models V-75, V-200 and V-500, with capacities up to 100 tons, are recommended to prevent "arching over" in large storage bunkers.

Additional information will be sent upon application to the Syntrol Company, 227 Lexington Ave., Homer City, Pa. Please mention CONTRACTORS AND ENGINEERS MONTHLY.

### Handbook of Bolt, Nut And Rivet Standards

Highway shops and all users of rivets, bolts and nuts should find of practical value a handy reference book compiled by the American Institute of Bolt, Nut and Rivet Manufacturers, 1550 Hanna Bldg., Cleveland, Ohio. The book is intended as a basic aid to design and assembly, to assure selection of the proper fastener for specific purposes.

Copies of the book, "Bolt, Nut and Rivet Standards," may be secured by writing to the Institute. Price: \$1.00.



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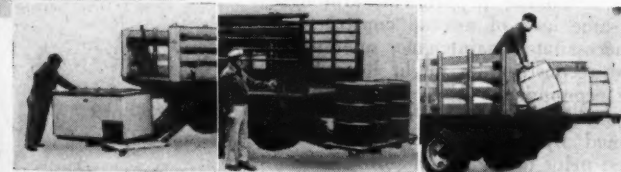
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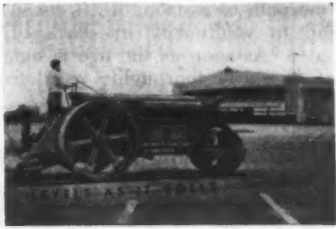
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One of the Hercules road rollers now made by W. A. Riddell Co.

### Riddell Takes Over Hercules Road Rollers

The W. A. Riddell Corp. of Bucyrus, Ohio, announces that it has acquired all manufacturing and sales rights to Hercules road rollers and Ironerolls, previously made and sold by The Hercules Co. of Marion, Ohio, and will continue to make and distribute these products under the name of The Hercules Roller Co., with headquarters in Bucyrus. Production will start as soon as practicable, and replacement parts for all Hercules rollers now in the field will be available from The Hercules Roller Co.

The Hercules line of rollers was introduced in January, 1930, and was featured by ball and roller bearings, steel castings, six-cylinder engines, and three speeds forward and reverse. Later, the Hercules Ironeroll was put on the market. This unit is characterized by a third roll, flexibly mounted at the rear of the roller, for leveling off high spots in road surfaces, and which is interchangeable with the scarifier.

Carl G. A. Schmidt, Jr., Manager of Sales for The Hercules Co., has joined the Riddell organization in the same capacity, and will also promote sales of its entire line of road machinery. Distribution of Hercules rollers is expected to continue through the present group of dealers as well as through many Warco distributors.

### Catalogs on Two Types Of Bethlehem Guard Rail

Two kinds of metal guard rails are described in catalogs recently received from the Bethlehem Steel Co. One features three and four-strand galvanized-wire-cable guard rail and the special bumper-type brackets on which it is installed. Photographs are included, as well as line drawings and diagrams giving directions for setting up this type of rail, and descriptions of the supplementary equipment which may be used in conjunction

with it.

The second catalog describes Safety Beam guard rail, which is rolled of heavy steel plate in standard 12-foot 6-inch lengths. This type, it is stated, can be used anywhere but is especially applicable on narrow bridges where its flat construction eliminates bulkiness. This booklet also contains photographs showing installation procedure, and a detailed diagram of the rail construction.

Copies of these catalogs will be sent to interested highway engineers and contractors upon written application to the Bethlehem Steel Co., Bethlehem, Pa., and mention of this item.

### New Catalog on Digging And Rehandling Buckets

A 16-page pocket-size booklet presenting a complete line of digging and rehandling buckets is ready for distribution by The Hayward Co., 32-36 Dey St., New York, N. Y. Various types of clamshell buckets are featured, as well as orangepeel buckets, an electric-motor bucket and a variety of grapples suitable for special services. Included also is information on an automatic take-up reel which comes in cable capacities of 75, 100 and 150 feet. Further, it is stated that the company will welcome the opportunity to help solve any digging and rehandling problems.

A feature of the booklet is announcement of a plan to make shipments of Hayward buckets by cargo plane just as soon as such means of transportation are accessible to civilian use.

### New Chemical Process Of Soil Stabilization

The combination of specially treated resin and other chemicals to form a dry powder, known as Stabinol, for use in waterproofing soils is described in a bulletin now available for distribution. The new product is said to mix easily with a wide range of soils, although it is particularly recommended for use with those of relatively high silt or clay content. It may be used for stabilizing unsurfaced dirt roads in rural areas where the traffic is light, or it can be mixed with the base soil for main highways with hard wearing surfaces.

Copies of the bulletin, which contains some interesting photographs of laboratory tests of Stabinol, may be obtained by writing to the manufacturer, the Hercules Powder Co., Wilmington, Del. Just mention this review.

### Vehicle Speed Limits Should Be Uniform

Two very important points in the limiting of the speed of motor traffic on the highways came up in a discussion recently with the traffic engineers of several states. They were emphatic on the point that speed zoning should be used more universally than it is, even with the 35-mph limits. In normal traffic times there is far greater need for controlling the speed according to the character of the highway and its environs. The "Slow-School" sign is well-known to motor-car owners, but what does that "slow" mean when one driver has just turned in onto the main highway and has not attained a speed in excess of 15 miles per hour, and another driver has come cross country and has had an average speed of 55 miles an hour for the last several hours? To the latter, 40 miles per hour will seem slow.

Signs should not leave to the driver the selection of the speed but they should display right on the sign the

maximum speed that is permitted in that zone and preferably some word or words indicating the reason for the restriction. The use of the word "School" has its meaning to every driver; he is immediately cognizant of the presence of young children who are liable to be carefree in their actions. "Factory" implies the exit of large numbers of workers at the change of shift and places the driver on guard.

The other traffic consideration is a different maximum speed on the highway for trucks and passenger cars. While this is primarily intended as a safety measure, it in reality creates innumerable traffic hazards through the number of times the faster traffic has to pass the slower traffic. On two-lane highways, this is particularly true, as it is on hills where the heavier truck traffic slows down far below the speed limit. This may be overcome by the use of the passing lanes which originated in the widened shoulders on Connecticut roads and have been used on new concrete roads in many places.

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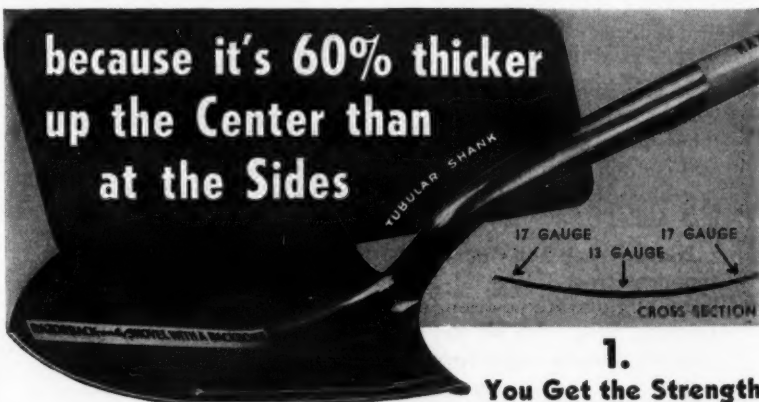
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You Get the Strength of a 13 Gauge Shovel with Only 15 Gauge Average Weight.

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Resists Wear as Well as Breakage



The thicker center extends to the cutting edge where it retards wear-back.

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Also Stone, Ballast, Industrial Forks, Asphalt and Road Rakes. Distributors Everywhere.



## How to Fight Fires Of Different Kinds

With practically all construction material, fuel and lubricants on the scarce list today, it is essential that every protection be provided against fire and, should a fire get started, the proper way to fight it should be known by every one of your employees. This precaution applies on all types of construction and in state and county shops today and in the post-war years. Most incipient fires can be put out in a fraction of a minute, if the man who is operating the extinguisher knows how to use the equipment to best advantage.

In fighting a fire in ordinary combustibles such as wood, paper, textiles, etc., the extinguisher stream should be aimed at the base of what is burning, and not at the smoke and flames. Application should be continued until the fire is completely out. Then the operator should search the remains for glowing embers and drench thoroughly any that he finds.

Fires in flammable liquids generally fall into two categories—those in containers of liquids, and those in spills. If a foam, vaporizing-liquid or loaded-stream extinguisher is used, the operator should play the 'extinguisher stream against the far inside wall of the container just above the burning surface. This will avoid splashing and permit a natural spread of the extinguishing fluid back over the burning surface. Where possible, the operator should walk around the container while directing the stream, so as to get maximum coverage during the discharge period. Where an operator using a foam or loaded-stream extinguisher must remain at a considerable distance from a container of

burning liquid, the extinguisher, directed at a high angle, may be allowed to fall lightly on the burning surface. In no case, however, should the stream be directed into the burning liquid.

If a carbon-dioxide extinguisher is used, best results can be obtained by directing the discharge as close to the burning surface as possible, starting nearest the operator and then progressing forward, moving the discharge horn slowly from side to side. The discharge should be continued even after the flames have been extinguished, to cool the liquid and prevent a possible re-flash.

In fighting fires in spills, the operator should put out the flames nearest him first, and then slowly sweep out the fire as he advances along its path.

Fires in electrical equipment should be fought the same way as those in ordinary combustible materials. If vaporizing-liquid or carbon-dioxide extinguishers are used, the operator can advance as close to the fire as necessary before the current is turned off, though best practice is always to turn off the current first. If water or water-solution extinguishers are used (although they are not recommended for fires in electrical equipment), the equipment must be made electrically dead before application begins; otherwise damaging short-circuits can result and, if the voltage is high, a harmful charge may travel up the hose stream to the operator.

A few general safety rules should be kept in mind. The operator should stand as far from the fire as conditions and effective use of the extinguishing agent will allow. In the case of a 2½-gallon soda-acid extinguisher, the effective horizontal discharge length is from 30 to 40 feet; in that of a 15-pound car-

bon-dioxide type, about 6 feet. The operator should maintain his position between the fire and an exit to permit ready escape; if the fire is outdoors or

in the path of a strong draft, he should stand to windward (his back to the wind). As soon as the fire is out, the area should be thoroughly ventilated.

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**MODEL 145-GZ WAUKESHA ENGINE**  
Six cylinders, 5½ in. bore x 6 in. stroke, 817 cu. in. displ. Burns gasoline... is designed to use modern aviation fuels... develops high output. And it's really rugged! Crankcase and cylinder block cast as a single unit. Crankshaft is drop-forged steel, heat treated. Wet sleeve cylinders easy to remove and replace. Positive pressure oiling. Thermostatic by-pass system guards against overcooling, assures quick warm-up when starting.



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Right now all Waukesha production is for war work. After the war is won, peacetime Waukesha Engines will be ready for all your special requirements. Consult Waukesha engineers now about your future engine needs.

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# Air Maps Aid in War And Post-War Plans

**Aerial Photographs of Pennsylvania Have Been Put to Wide Variety of Uses; Example of Costs**

IN 1937 a program for the aerial photographing of the entire surface of the State of Pennsylvania was urged by the State Planning Board. In 1939 the program was authorized and funds provided. This project was finally completed in June, 1941, and six months later the United States was at war.

Throughout the past two years the existence of this complete file of air photographs has been an important means of expediting the location of war plants. It has saved weeks and perhaps months of field work in determining areas best suited for various types of military installation and has enabled the Federal government and various local governing bodies, as well as public utility companies, to lay out routes for highways, pipe lines, telephone and electric power wires, and extensions of railroad rights-of-way.

The Department of Highways has made extensive use of these photographs in connection with its highway planning program. Geologists have found them important in conducting preliminary field investigations. The United States Army found them essential in planning military defenses.

In many of the state's communities directly affected by the growth of defense industry, the use of air photographs was of vital importance in planning needed public facilities and emergency housing necessary for the war effort. Other towns and cities have found the photographs, in the form of mosaic

maps, indispensable in zoning work and in making comprehensive plans. Allegheny County, faced with an immense war boom, has made use of air photographs in vital land-use planning and allocation of public facilities.

Crawford County, in the latter part of 1942, was preparing a Road Docket Index in which it was proposed to show the location of every road which had ever been petitioned for, approved, disapproved, located, relocated or abandoned. Anyone who has ever tried to locate old roads from record descriptions, many of which refer to land marks long since obliterated, realizes the difficulties involved unless some key is found. Wesley G. Reitze, Chairman, Crawford County Commissioners, Meadville, Pa., writing to the Pennsylvania State Planning Board said, "We have already found a number of instances where roads which have been vacated for many years show up plainly on the air photographs, even when they cannot be seen on the ground." Crawford County has also used the air photographs in the preparation of maps for the County Zoning Ordinance and in assessment work. These photographs also led to the discovery of nearly 2,000 properties that were not paying taxes as they had never been on the assessment rolls.

## Costs

The cost of air photographs is best illustrated by a concrete example. Crawford County, Pa., which has an area of 1,016 square miles is covered by 741 photographs of the state-wide series. The location of these prints is shown on seventeen photo index sheets. The contact prints, which are 7 x 9 inches, are on a scale of one inch for 1,667 feet. The prints overlap sufficiently for use with a stereoscope. Contact prints and photo index sheets for an area equal to that of Crawford County would cost

approximately \$125. These prints are not recommended for county planning or tax-assessment purposes as the scale is comparatively small.

The more intensive the study to be made of an area, the more important it becomes to use enlargements of a scale adequate to show all necessary detail. In such enlargements, individual houses and even smaller structures are readily discernible and comparative street and road widths may be determined with a fair degree of accuracy.

The cost of enlargements of 370 alternate prints, giving full non-stereoscopic coverage, and the necessary photo index sheets for an area approximating that of Crawford County at various scales, according to the State Planning Board of Pennsylvania, is as follows:

1 inch equals 1,000 feet.....	\$179.25
1 inch equals 800 feet.....	179.25
1 inch equals 600 feet.....	253.25
1 inch equals 500 feet.....	475.25
1 inch equals 400 feet.....	752.75

A valuable 24-page booklet "Air Pho-

tographs" with an extended discussion of the uses of aerial photographs and numerous illustrations of different types of photographs and their uses may be obtained from F. A. Pitkin, Executive Director, State Planning Board of Pennsylvania, Harrisburg, Pa. Material for this article was taken from the booklet.

## Road Maintenance Units Described in New Folder

The Littleford line of bituminous equipment for the construction and maintenance of roads and runways is described and illustrated in a recently issued folder entitled "Be On the Double Quick". Included are the 84-DH kettle for the quick heating and production of bituminous material, the No. 101 Utility spray tank, emulsion sprayers, and the portable Trail-O-Roller.

Copies of this folder may be secured direct from Littleford Bros., Inc., 485 E. Pearl St., Cincinnati 2, Ohio.

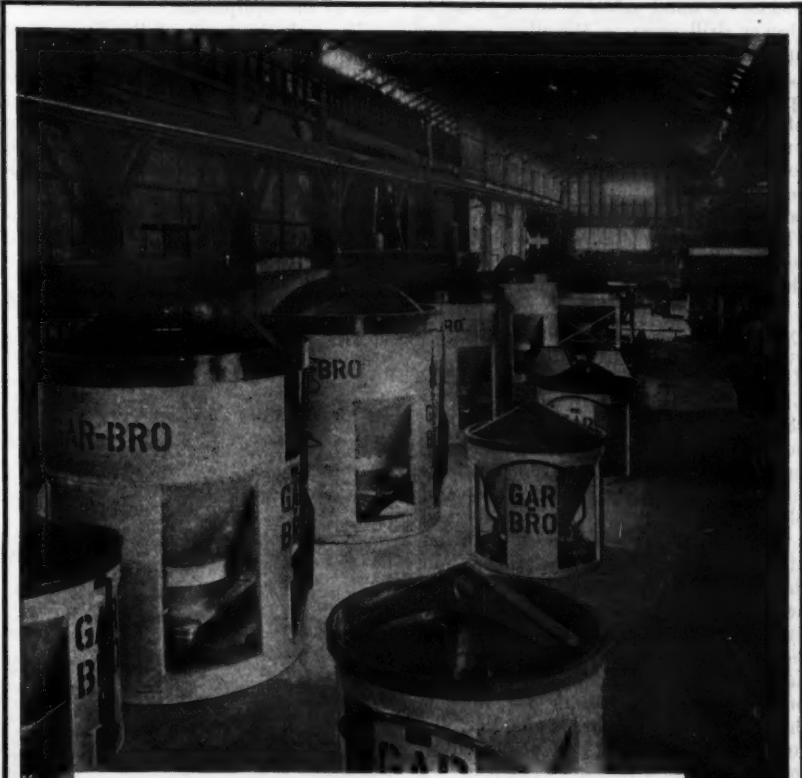
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## Ind. Central Garage Keeps Units Working

(Continued from page 47)

of the shops includes a large water bath for testing radiators, a Manley hydraulic arbor press, a Bean wheel aligner, a Black & Decker valve grinder, a Barrett brake-lining machine, and a greasing rack with a cable lift. A series of metal trays are used to hold the parts from transmissions, brakes, and other assemblies which have been torn down and are awaiting repair parts.

On the third floor are the electric and machine shops. In the electric shop, where batteries, generators, and starters are overhauled, is a standard Allen Unitor rectifier, a Marquette fast charger with a rectifier unit, and a motor-generator set also used for fast charging of batteries. Other equipment in this shop includes a hand arbor press, a Black & Decker drill press, a Marathon grinder and buffer, and four benches.

The machine shop has many vacant spots these days, as a considerable part of the large lathes and other equipment has been lent to the Government to stock local munitions plants. In the shop, a considerable amount of cylinder boring and crankshaft grinding is still done. The equipment includes a 14-inch x 5-foot lathe, a Heald cylinder-boring machine with blower, a Kwik-Way grinder, a 17-inch Economy shaper, a Kwik-Way cylinder hone, a Hisey-Wolf grinder and buffer, a Reed-Prentice drill press, a Riess brake-servicing unit, a Leland-Gifford drill press, a power hack saw, an 18-inch x 9-foot Monarch lathe, a line-boring machine, and a Weaver brake-lining unit. The shop is served by a long monorail with hand chain falls and blocks.

The lending of a considerable portion of the equipment to the Government and the lack of skilled labor have made it necessary to contract for most of the overhauling of gas motors. A six-stand test block has been built, with the exhausts carried out the window, for rebuilt motors. All motors are run on these blocks for 48 hours so that they are fully broken in before they are installed in the trucks or passenger cars.

A very complete tin shop is used for all sheet-metal work. It is equipped with Bertsch squaring shears, and Niagara straightening rolls, cornice breaks, burring machines, and a bench moulder.

On this floor there is further space for the storage of frozen automobiles, and a section is wired off for the storage of rebuilt engines for exchange with the sub-district garages when they turn in a complete motor. Another section is used for the storage of new batteries.

Large locker rooms and wash rooms with multiple bowls with running hot and cold water are provided.

### Inactive Warehouse

A warehouse located behind the Indianapolis Sub-District Garage about 2 miles from the Central Garage is used

for the storage of inactive parts and second-hand equipment. A stockpile of old parts for obsolete equipment, such as the 10-ton Holt tractor, is maintained here. When there is no further use for these parts, they are sold in lots on bids received from local junk dealers. The stock of scrap metal is kept low by selling it frequently and thus constantly aiding the war effort.

### Active Field Work

An equipment inspector makes the rounds of all sub-district garages and submits a "salvage report" to the Equipment Supervisor, who makes his recommendations as to whether the machine should be sent to the Central Garage for salvaging or should be torn down and sold for scrap, with some of the parts being retained for the maintenance of other equipment. The Superintendent's report is then delivered to the head of the Maintenance Division and then to the State Highway Commission, which gives its final approval for salvaging or sale of the equipment.

Through the work of the Equipment Inspector, such jobs as the following are frequently possible. Two trucks which had been damaged at different times and in different ways and were no longer serviceable were salvaged in such a way that one good truck resulted, with a reasonable stock of spare parts, and some scrap which was sold. The motto of the Shops is, "Ponder, patch, and put back into service".

### Equipment Roster

Air compressors	
Portable	15
Stationary	38
Air hammers, stone drills, paving breakers, and riveting sets	35
Automobiles	484
Center-line markers	
Hand	52
Motorized (White)	6
Distributors	
Bituminous	12
Calcium chloride	27
Sand (Butler)	380
Graders	335
Graders, power	6
Heaters, tank-car	14
Kettles, tar-heating	408
Loaders	8
Mixers	
Bituminous	115
Concrete	57
Maintainers	163
Miscellaneous	89
Mowers	
Tractor	81
Trailer	100
Plows, road	100
Plows, rooster	14
Plows, snow	578
Pumps	
Gas engine, water	56
Gasoline	212
Road rollers	51

Road rollers, portable	68
Scrapers, truck	19
Shovels, power	37
Sod cutters	6
Sweepers	39
Mechanical	28
Motorized	12
Stone spreaders	28
Tanks	24
Storage	37
Water	191
Trailers	101
Unloaders	16
Trucks	
Pick-up, panel, and station wagons	130
Under 2½ tons	816
2½ to 5 tons	160

Total .....5,178

Between July 1, 1942, and July 1, 1943, twenty-three pieces of equipment were salvaged, leaving 5,155. Two salvaged pieces were put back into service, and 12 new FWD trucks were purchased, making the roster 5,169 as of July 1, 1943.

### Personnel

The Central Garage and Shops of the

State Highway Commission of Indiana at Indianapolis are operated under the direction of Norman F. Schafer, Superintendent of Maintenance. J. R. Gardner is Equipment Supervisor, and R. K. Sines is Superintendent of the Central Garage. The State Highway Commission of Indiana is comprised of four full-time Commissioners: S. C. Hadden, Chairman, and Jap Jones, Albert J. Wedeking, and Thomas B. McDonald.

The war has definitely removed all doubt, if any existed, concerning the major role of highway transportation in our national economy. The far-reaching disturbances engendered by the restraints imposed on highway use have demonstrated rather conclusively that highway transportation is indispensable to our American way of life.—Walter A. Rensfield, Illinois Director of Public Works and Buildings.

## ERIE BUCKETS



• Erie builds all types of buckets in various capacities and weights to meet the job and operating conditions. Choose the correct bucket for the job and you get maximum speed and output. Write for broadside on the complete Erie line of buckets.

**ERIE STEEL CONSTRUCTION CO.**

ERIE, PENNSYLVANIA

Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearings and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

Manufactured by

**McCaffrey-Ruddock Tagline Corp.**

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Forsythe Equip. Co.  
Long Island City, N. Y.

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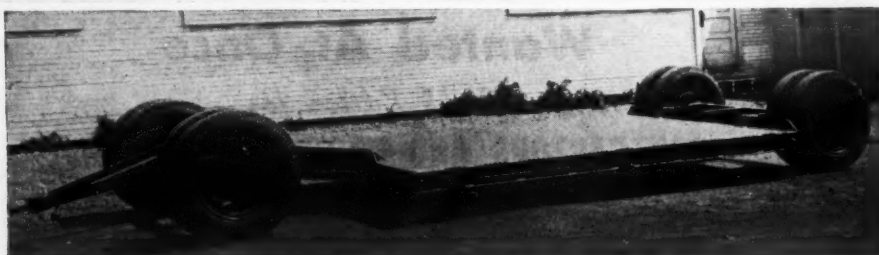
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Don't say, "We want a TRAILER." Say: "We want a MARTIN Trailer."—This will insure your getting a trailer that's EASY LOADING, POWERFUL, FAST, SAFE, LONG-WEARING and ECONOMICAL. . . .

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**Martin Machine Company, Kewanee, Ill.**

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capacities

WRITE FOR BOOKLET



FEATHER the nests of our multiplying warbirds—or there will be no nests left to any of us. Buy Bonds. CONSERVE, stimulate, protect—all in one—buying Bonds.



# Future of Aviation Linked with Roads

## Air Travel Will Stimulate Airports, Landing Strips, Highway Services and New Urban Express Highways

By L. WELCH POGUE, Chairman, Civil Aeronautics Board, Washington, D. C.

THERE was a time when people thought that aviation would be a "grand piano" business, that is to say, that aviation by its nature would be limited to large airplanes essentially of the transport type, and that the only fellow who would operate a little plane would be the "sport" or person who was so wealthy that he could spend any amount of money to satisfy himself with a hobby. That idea is gone. There is intense interest in private flying throughout this country.

The generation in schools below the college grades are eager to learn more and more about aviation. The insistent demand to be permitted to take the pre-flight aeronautics courses sponsored by the Administrator of Civil Aeronautics which are given now in over 15,000 high schools, half of our total number, has made it clear that whatever the interest of the present generation may be in aviation, that of the coming generation is large, insistent, and determined.

### More Private Flying

The progress thus far made in the development of so-called fool-proof airplanes is good. All things considered, it now appears clear that the citizens of average intelligence will be able to fly a private airplane and that many such citizens will own one. The Administrator of Civil Aeronautics has recently estimated that by 1950 there will be 500,000 private civil airplanes in the United States. This represents an increase from a base figure of approximately 20,000 a few years ago. So far as being precisely accurate goes, he may be right or he may be wrong, but certainly the number is going to be very large, and if we stretch our minds a quarter of a century, we would probably all agree that it is likely to be much larger than 500,000. Once the movement gets going, there'll

be no stopping it; and the idea that a fellow won't fly because he can go more cheaply some other way has been proved completely fallacious by the early development of the automobile. When flying fires the imagination of the private citizen, he is not going to be content to go long distances any other way even if it is cheaper. Maybe he will go the other ways for a time, but it seems certain that he won't feel content to do so. If Americans are not content, they are so constituted that they set about improving their condition. That is why they came here and became Americans.

However, this very wide-spread development in private flying does not mean that airplanes are going to supersede automobiles, not at all; as a matter of fact,

it is my opinion that they will accelerate travel in the automobile by furthering travel habits and desires. This development appears particularly probable in the light of the fact that just before the war 84 per cent of the automobile travel consisted of journeys of less than 20 miles in length and over 90 per cent consisted of journeys of less than 30 miles in length. Of the total automobile passenger travel in a typical pre-war year, only 0.2 per cent constituted trips of over 500 miles in length.

### More Auto Travel

It thus appears quite clear that however rosy you may predict the future of private flying and air transport, the automobile is certainly going to hold its own. It is likely that additional travel habits developed through the use of aviation will accentuate the desire to get about quickly when on the ground. There are several forward-looking engineers in the industry who are confidently predicting the sky-car which can fly in

the air and when it lands, fold its wings and drive along as a passenger car on the ground, and also, that the helicopter will do the same sort of thing. Whatever may be one's theories about the future expansion of private flying and air transportation, it is a safe prediction that a very widespread and important

(Concluded on page 79)

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**SPEED YOUR WORK  
SAVE MANPOWER**  
with Master Equipment  
"PREFERRED THE WORLD OVER"

Power, portability, simplicity and built-in dependability distinguish all Master Vibrator Company equipment . . . make it the choice of thousands of engineers and contractors wherever work must be done fast, efficiently and at lowest operating and manpower cost. Immediate delivery. Write for literature at once!

☐ Full line of Flood and Shovel Lights (not illustrated).



☐ Electric "Power Blow" Hammer and Tools for heavy or light duty work. Model 650 Generator Plant to operate hammer when electricity not available.

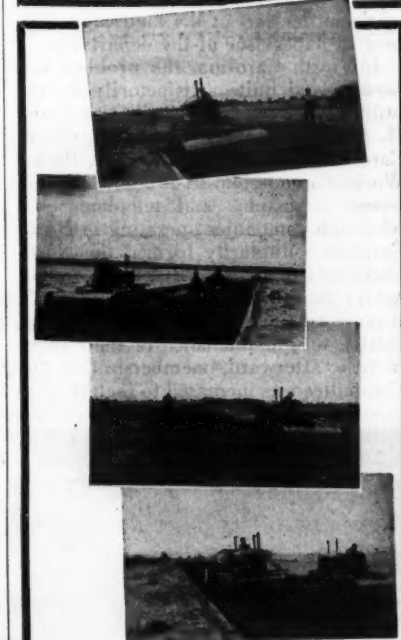


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Dayton 1, Ohio • Distributors throughout United States and Canada  
Products Include: Concrete Vibrators • Gas or Electric Surfacing Attachments • High Speed Tools • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants, 500 Watt to 17000 Watt, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Electric or Gas Engine Driven Power Blow Hammers

**FOR Mixed-in-Place CONSTRUCTION**



Highways, streets, airports, cantonments—on bitumens, clays, chlorides, soil-cement, etc.



### IT DOES THE JOB THOROUGHLY, RAPIDLY, AND ECONOMICALLY

The AGGMIXER operates with other general purpose road equipment—from power take-off shaft of any suitable tractor—easy and safe to operate. The swirling chopping action of the AGGMIXER tines does a thorough job of mixing—wet or dry.

Send for job facts now.

Awarded Oct. 30, 1943

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# PARSONS

## For Speed in Digging Pipe Line Trenches

Trees, Poles, steep banks and other obstructions won't halt your pipe line digging when you are using a Parsons Trencher with the shiftable offset boom. Excavations may be made with boom in extreme right or left hand position, without sacrifice of speed or ease of operation. With a Parsons you can dig within 14 inches of a side obstruction, and on line with outside edge of either crawler. This one Parsons feature alone will save hours of digging time.

for complete details write  
**THE PARSONS COMPANY**  
NEWTON, IOWA



For extra wide trenches, not too deep, dual booms may be effectively used.

**TRENCHING EQUIPMENT**



### Avoid Waste in the USE OF PAPER!

To Aid the WAR EFFORT—

- ★ Every pound of paper must be used wisely.
- ★ We must salvage paper normally thrown into the waste basket.
- ★ Avoid waste. Salvage paper for military use.

**CALL A COLLECTOR!**





## Regulating Utilities Using the Roadsides

**Wanton Slashing of Trees to Prevent Interference with Overhead Wires Must Be Properly Controlled**

THE regulation of public utilities along state highways is invariably a topic of conversation whenever maintenance engineers and landscape supervisors meet in conference. The subject is important, as unregulated cutting of shade trees along highways not only makes the trees unsightly but endangers their very existence. With the possibility of expansion of rural telephone and electric-power lines after the war, the subject is one which needs thought now. In a few states franchises or state legislation put regulation of the placing of poles and tree trimming on the highway right-of-way under the highway department. In more states, such control as does exist is the result of diplomatic work on the part of the landscape engineer or supervisor of the department.

In North Carolina, the problem has been solved quite satisfactorily by the utilities themselves, according to Frank H. Brant, Landscape Engineer, North Carolina State Highway and Public Works Commission. In 1936 the electric-power companies and telephone and telegraph companies operating in North Carolina voluntarily formed the North Carolina Utilities Coordinating Committee for the purpose of quickly and easily ironing out conflicts in construction, operation and maintenance of their lines. Shortly afterward, membership in the Committee was increased to include gov-

ernmental agencies that were wire-owners, such as the State Forest Service, municipal utilities, and REA Cooperatives; and the State Highway and Public Works Commission.

Regulations covering the care of plant growth in the highway right-of-way and suggestions to the companies for treatment of their own right-of-way that will improve roadside appearance have been adopted by the Committee. Although the regulations are not statutory, they have proved to be of value in improving relations between utility companies and the state highway organization. The regulations which were adopted March 18, 1941, comprised six paragraphs, with an additional five paragraphs of suggestions for clearing practices and utility rights-of-way.

The "Regulations Governing Clearing for Construction or Maintenance of Utility Lines Along State Highways" are:

1. When the poles of a new line are placed 1 foot outside of the right-of-way line of highways on the numbered state highway system, the regulation points out, the fact that the poles are not encroaching upon the highway right-of-way does not automatically give permission to cut trees and shrubs existing on the highway right-of-way in order to get proper clearance for the line. Such permission will be considered, and given or refused, at the time construction notices are sent to the State Highway and Public Works Commission for approval. In cases where there are specimen trees or particularly scenic woodland on the highway right-of-way, it will be required that the poles be set far enough from the highway right-of-way so that the inside edge of line clearance will not be inside of the highway right-of-way line.

2. In the cases of specimen trees in the highway right-of-way that are also

a part of a private development, such as home grounds, schools, churches, etc., permission given by the commission for cutting of such trees applies only to the Commission's interest in them, and is not to be construed as freeing the utility corporation from liability for damage to the property owner.

3. When permission is given by the Commission for cutting plant growth in the highway right-of-way, the saving of low-growing and slow-growing plant growth (that will never grow tall enough, or at least not fast enough, to cause a line-clearance problem) will be required. Included in this class of plants are cedar, dogwood, holly, redbud, wax myrtle, gallberry (also called inkberry), huckleberry, mountain laurel, azalea, and others.

4. When permission is given by the Commission for cutting plant growth in the highway right-of-way, all cutting must be done flush with the ground, in the case of axe work; and in the case of saw work on larger growth, cutting must be done as close to flush with the ground

as is possible.

5. All logs, tree laps, and brush (except herbaceous plants such as weeds, native flowers, and grass) that are cut from or fall upon the highway right-of-

(Concluded on page 78)



"Take it from me — the next time I buy a wheelbarrow it's going to be one of those modern Easy-Wheeling STERLINGS. I've pushed and tugged away at this old jalopy long enough. I've learned the hard way that —

### IT ALWAYS PAYS TO BUY THE BEST"

Sally has the right idea. Invariably it pays to spend a few dollars more for the best equipment available. That's why Sterling Wheelbarrows are in such great demand! Regiments of sturdy Sterlings are helping Uncle Sam speed Victory... more will be available in the postwar era.

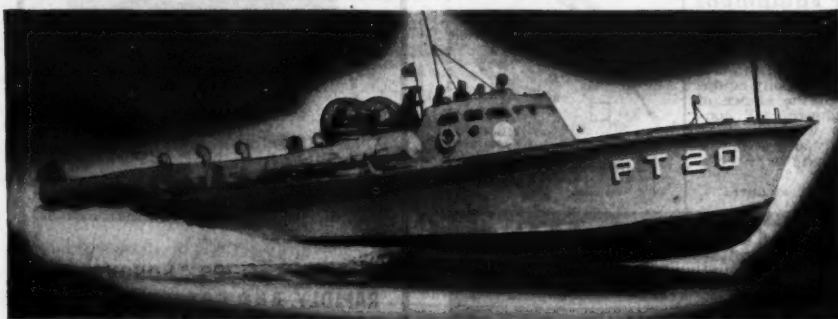
**Sterling Wheelbarrow Co.**  
Milwaukee 14, Wis., U. S. A.



**Sterling**  
WHEELBARROWS



**Back the  
ATTACK!  
Buy War Bonds**



## You Can Use OUR War-Time Experience To Improve YOUR Peace-Time Products

The ahead-of-schedule ingenuity of our development and production engineers, in meeting the most rigid Government clutch specifications and inspections, can help you build more efficient power transmission control into your post-war models. Successfully equipping our nation's war machines with numerous types and sizes of clutches

has provided ROCKFORD engineers with experience that will be of considerable value to you when designing similar strategic advantages into your new products. Our field and factory engineers will be glad to give you the benefit of their recommendations, based upon your specifications. Your inquiry will receive prompt attention.

SEND FOR THESE HANDY BULLETINS  
ON POWER TRANSMISSION CONTROL

Give capacities, dimensions and specifications. Contain application diagrams. Show HOW exclusive features of ROCKFORD CLUTCHES and POWER TAKE-OFFS are being utilized to give road machinery manufacturers competitive market advantages.

## ROCKFORD CLUTCHES



have a wide range of application in tractors and powered road machinery. Made in single or double drive plates, in sizes up to 20 inches in diameter. Operate in oil or dry. Transmit up to 80 h.p. at 100 r.p.m.

**Rockford Drilling Machine Division Borg-Warner**  
314 Catherine Street, Rockford, Illinois, U. S. A. Corporation



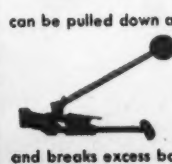
Pullmore Multiple-Disc Clutches • Over-Center and Spring-Loaded Clutches • Power Take-Offs

## PUNCH-LOK Streamlined HOSE BANDING METHOD



## SPEED-SAFETY-ECONOMY In Clamping-Splicing- Repairing-Mending- Tying-Reinforcing

PUNCH-LOK Streamlined Hose Banding Method is being used in hundreds of production and maintenance jobs in all industries for connecting high-pressure hose; splicing electric cable; stopping leaks in steam and water lines; reinforcing and mending splits in cross-arms and ladder rails; tying rigid conduit or flexible cable to existing pipe lines or girders; tying ends of wire or manila rope to prevent fraying—and many other jobs. PUNCH-LOK is giving wartime industries a fast, safe, economical, quality banding method. Investigate NOW the many advantages it will have for you in your present and postwar work. Let PUNCH-LOK solve your clamping or banding problems!



**CLAMPS...** Made of flat, high tensile, galvanized steel, double wrapped. Available from 3/8" to 48" I.D. Any large size clamp can be pulled down and made into a smaller size.

**LOCKING TOOL...** Sturdily constructed to assure long life. Locks all size clamps with a tensional pull of 1,000 lbs. Hammer punches and breaks excess band flush at clip.

**GROOVED FITTINGS...** For water or steam lines. Permits application of high pressure clamping without damage to hose.

Write for Descriptive Catalog and Name of Local Distributor



Dept. 1, 321 N. Justine St.  
Chicago 7, Illinois



# Maintenance Program For Minnesota Roads

(Continued from page 65)

As a dust palliative on the large mileage of gravel roads, calcium chloride is applied at the rate of 1/2 pound per square yard by lime spreaders drawn behind maintenance-department dump trucks. Four men empty the sacks into the lime spreader while the truck travels down the road being treated. The work is done preferably following a rain but when this is impossible the road is sometimes sprinkled with water before the application of chloride. Calcium chloride so applied relieves the dust menace materially and is effective for a period of two to three months.

Calcium chloride was also used by the maintenance department on one state-force stabilization operation, 1 pound per square yard being applied with water and the base scarified, bladed and rolled. This work was done to relieve heavy traffic on a gravel access road to a war plant.

## Road Preservation by Restriction

Another function of Minnesota's maintenance department is the regulation and issuance of permits to move overweight and oversize loads on the highway system. In a normal year, such as 1940, 7,000 such permits were granted, with routing, loading, clearances, and time of day for the movement to occur specified and checked by the maintenance department.

During the spring thaws, when necessary, loads on unpaved roads are restricted to weights of 3 to 7 tons per axle, depending on the construction of the road, and during this period no permits are granted for movement of overweight loads on restricted roads.

## Spillways and Lined Ditches

Ditches lined with concrete under former construction plans have caused considerable maintenance expense in some sections of the state. Occasional flooding or temporary stoppages have forced water outside the concrete lining, causing exterior erosion and in some cases collapse of the structure. This condition has been repaired, and is prevented on new construction, by building vertical walls of concrete, spaced at varying intervals, which serve both as footings and cut-off walls. These walls are constructed at an angle to the line of flow.

For spillways discharging down an embankment slope at right angles to the center line of the road, Minnesota's maintenance department favors the use of drop inlets and pipes rather than an open flume, as their experience with existing structures of both types indicates that considerably less expenditure for maintenance is required for the pipe structure. Likewise, where speed of flow will permit, sodding of run-off channels is preferred.

## Operator's Handbook For Euclid Equipment

To assist in the present need for training new operators and to give experienced operators a better knowledge of their equipment, the Euclid Road Machinery Co., Cleveland, Ohio, has published an Operator's Handbook which will be helpful to all owners and operators of Euclids. Following an explanation of the construction of the equipment, and diagrams showing the location and function of various parts, the book gives explicit instruction for the best methods of operating and maintaining it for maximum performance and minimum depreciation. The book also has helpful hints on the problems of safety, cold-weather treatment, and storing, and contains tables of tire data, temperature

data, lubrication charts and schedules, and suggestions for the inspection and testing of the air-brake system. The 68-page book is sturdily bound and profusely illustrated.

Owners, operators and mechanics working on Euclid rear-dump and bottom-dump equipment can secure copies of the Operator's Handbook by writing direct to the manufacturer on their company letterhead and mentioning this review.

## Douglas Fir Plywood Assn. Names Midwest Field Man

Announcement has been made of the appointment of Donald M. Crooks, sales and production executive of several western prefabrication firms, as mid-west representative for the Douglas Fir Plywood Association, with headquarters in Chicago, where he will serve as consultant on applications of plywood in the industrial and prefabrication fields. Mr. Crooks succeeds David S. Betcone, now eastern representative for

the fir plywood industry in Washington, D. C. A third Association field man,

Joseph Weston, is located in Los Angeles, Calif.

# WINPOWER ELECTRIC PLANT

MODEL WP3  
(Air Cooled)

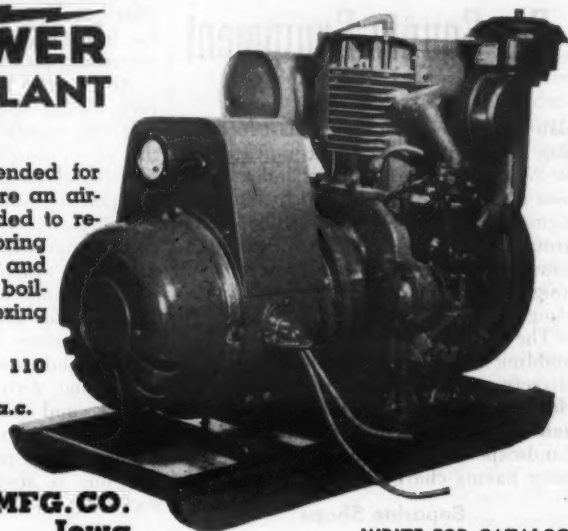
—especially recommended for construction jobs where an air-cooled engine is needed to reduce weight and to bring freedom from radiator and fan troubles due to boiling in summer or freezing in winter.

3000 watts, 32 or 110 volts, d.c.

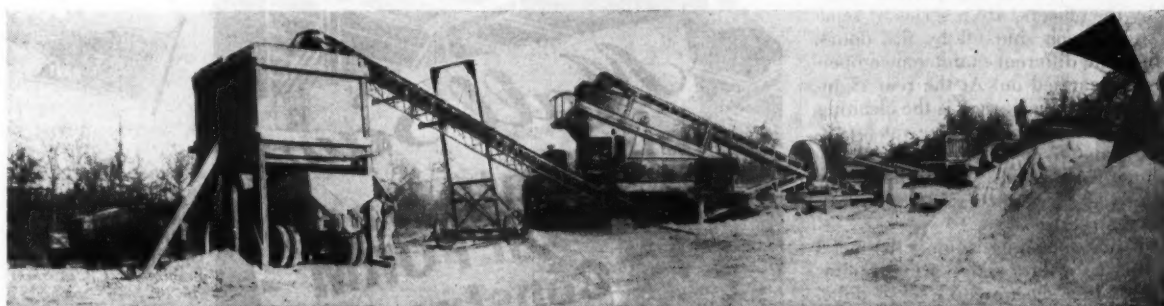
110 or 220 volts, a.c.

Other models—from 350 to 25,000 watts

WINDPOWER MFG. CO.  
Newton Iowa



WRITE FOR CATALOG



# More Aglime for More Food!

More food is needed, and there are fewer hands to produce it. Bigger crops from better soil is the answer, and aglime producers by the hundreds are responding with unprecedented tonnages of soil sweetener.

Typical of the many agricultural limestone plants equipped with Universal steel plate roller bearing pulverizers and other profit-proved Universal equipment are those pictured.

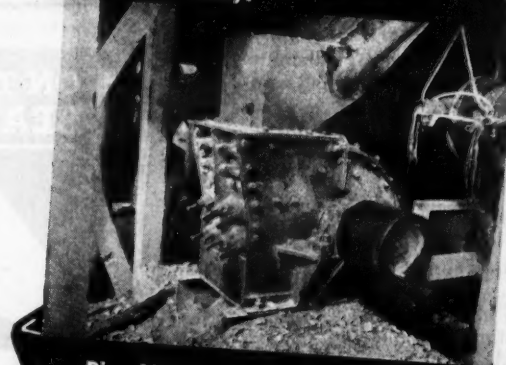
Representative of what Universal-equipped plants are doing for their owners and for the good of the country is the plant of A. R. Alvis, West Plains, Missouri, which is shown above averaging 250 tons of aglime per 8-hour day with fuel cost, including two quarry trucks and two 105' air compressors for drills, approximating \$18.08. Plant consists of apron feeder, 18" x 24" Universal Roller Bearing Primary Jaw Crusher set for 2" opening, 4' x 12' 2-deck vibrating screen and hopper, Universal No. 3 Pulverizer and Rotovator and conveyors. This operator has contracts for 35,000 tons this season and is doing a considerable daily cash business besides.

When postwar road building and repairs "get the green light," it will only be necessary to change the screens and the manganese steel grates to produce 1" to 1 1/2" material.

UNIVERSAL ENGINEERING CORP.  
620 C Ave. W, Cedar Rapids, Iowa



Trankle Bros., Waterloo, Illinois, Universal stationary aglime plant averages 90 to 100 tons daily.



Pine Hill Lime & Stone Co., Pine Hill, Ky., keeps production up with Universal hammer mill.

Universal engineers stand ready to help in converting your plant to aglime production and to assist in reconversion to road rock or aggregates after the war. Universal standard "packaged" units practically shipped from stock, keep the change-over and the operating costs low. Send for literature.

# UNIVERSAL

CRUSHERS. PULVERIZERS. COMPLETE PLANTS. SPREADER-ROLLERS. PORTABLE ASPHALT PLANTS



## Separate Shops Care For County Equipment

(Continued from page 63)

slab on a rolled granulated blast-furnace slag fill. Shovels weighing as much as 21 to 25 tons are brought in under their own power on this floor, which shows no signs of cracking. A monorail loop runs around the entire garage, permitting the handling of any parts, up to 5 tons in weight, by a hand-operated crane operating on the monorail.

The offices are in the center of the building at the front. At the left of the attractive entrance is the office for Heavy-Equipment and Road Maintenance, and at the right the office for the Landscape and Traffic Divisions, the latter having charge of signs and safety.

### Separate Shops

At the two ends of the garage and at the front, except for the portion occupied by the officers, are a series of separate shops, each shut off by fire doors, in which the different maintenance operations are carried on. At the rear right-hand corner of the garage is the cleaning room, containing a heated lye vat for removing paint from metal signs and two soapstone rinsing vats. The walls in this room are of tile, and the concrete floor slopes to a central drain.

Next to the cleaning room is the metal department, where signs are straightened and other sheet metal work is done. It is equipped with a Van Dorn drill press, sheet metal shears, a long sheet-iron work bench with a vise, and the other necessary small tools. At the time of our visit there were a number of miniature automobiles stored in this shop, awaiting overhaul and repainting. These small automobiles, each about 3 feet long, are used in the safety education campaign in schools throughout the county. City streets are set up with collapsible houses at the corners, traffic signals, and traffic comprised of these small automobiles.

Next in order, working clockwise around the garage, is the woodworking shop, where wood signs are made. This shop is equipped with a saw table and band saw and equipment for burning paint off old wood signs so that they may be reused. Allegheny County has prided itself on its display of artistic good-will signs on all major highways entering the county. All of these signs are made in this shop and painted in the adjacent sign shop.

The impression one gains upon entering the sign shop is that of an artist's studio rather than a work shop, because easels are set up at convenient points to get the best outside light, and they are also supplied with individual overhead lights. There are also vertical adjustable stands of 2 x 4's, with screw clamps to hold all sizes of signs for special work. Leading from the sign shop is an electrically heated drying room, with brackets for holding the signs and a ventilating system.

The sign storage room, between the sign shop and the sign and safety office at the front of the building, contains three double and one single rack for the storage of signs. These are built up of 2 x 4's with the horizontal members notched so that the signs are kept apart to prevent scratching. In this room the traffic-line marker for the district is stored, and there is a moderate-sized stock of reflector buttons, bolts, rivets, etc., for signs. The refurbished signs are issued from this room on requisition.

Going to the other end of the garage and starting again at the back, we come to the oil room, where oil and grease are stored. This room, as well as the sign shop and other rooms where explosive vapors exist, is equipped with fireproof and explosion-proof switches and lights.

Only a small stock of lubricants is kept in the district garage, as it is possible to replenish the supply promptly from the distributors holding the annual contract for lubricants. All greasing is done by pneumatic pressure.

Adjacent to the oil room is the wash rack, with a depressed drain at the center and with excellent lighting overhead, at the sides, and beneath. When not in use, the Hypressure Jenny for cleaning equipment is stored in the wash rack.

The garage is equipped with two garage compressors, one, adjacent to the oil room, which is used for tires only, and a second large compressor in the basement for general shop service.

In the center of this end of the garage is the landscape storage room, where seed, lime, fertilizer, hose, hand tools, rollers, and wheelbarrows are stored. Like all of the rest of the shops, it has a fireproof fuse-plug-operated door, but this one is always kept open about 6 inches by a metal strip padlocked to the

latch but so arranged that should the fuse-plug operate, the door would close immediately. The reason for keeping this door open is to permit the garage cat to enter the room and keep down the field mice which eat the seed.

In the front corner of this end of the garage are the blacksmith and repair shops, complete with a brick forge, anvil, tool rack, bench and vise, and Milwaukee Electric Tool Corp. drill press, a Black & Decker double grinder, and a good old-fashioned foot-power grindstone for scythes. An overhead 5-ton crane running on a monorail handles equipment being overhauled in these shops.

Special care is taken to save all damaged parts and all parts removed from equipment for salvage and re-use. One of the major pieces of equipment used in these shops is a P & H-Hansen Smooth-arc portable electric welder driven by a Waukesha motor.

Behind a locked screen is a room equipped for the repair of pumps and

other small equipment. In this room is an Atlas hydraulic press and an acetylene welding outfit. The tips and Presto-weld gages are kept locked up when not in use.

Between the landscape storage room and the blacksmith shop is a small-parts storage room, in which only a very small

(Concluded on next page)



# Mallsaws

REG. U.S. PAT. OFF.

## Eliminate Waste On FORM Construction

**SAVE TIME · LABOR and LUMBER**

MODEL 80 CAPACITY 2 1/4"

**MALLSAWS "pay-off" on all types of concrete form construction above and below grade by:**

- REDUCING SAWING TIME**—due to high speed and power—plus multiple cutting of like members at one time.
- ASSURING SQUARE BOARD ENDS**—that eliminate fins and projections.
- SALVAGING WASTE LUMBER** for spreaders, stoppers and bracers.

MALLSAWS are powered beyond ordinary requirements. They are fast and efficient for cross-cutting, ripping, beveling, pocket cutting and other sawing jobs. MALLSAWS also cut metal, cut and score concrete, tile, and stone with an abrasive wheel. They are perfectly balanced for use with either hand. Safety guard on all models.

**MALL TOOL COMPANY, 7743 South Chicago Avenue, Chicago 19, Ill.**

\*Ask Your Dealer for Electric MALLSAWS TODAY



Write for literature on MALLSAWS, MALL Gasoline Powered and Pneumatic Chain Saws in 24", 36" and 48" sizes, Gasoline Powered, Electric and pneumatic Concrete Vibrators, Electric Surface Planes and Drills.



### PORTABLE POWER TOOLS

## ON THE BEAM



-but  
NOT THE WALKING BEAM

by an Eccentric Drive. This Eccentric Drive means fewer moving parts, shorter over-all length, and less dead-weight. Hundreds of these Novo Diaphragm Pumps have joined up for the duration. "Come Hell or High Water," they can take it! Remember, of all Diaphragm Pumps, Novo is beamless, but ON THE BEAM.

Don't let a worn-out or out-moded Diaphragm Pump throw cold-water on your job. Send the attached coupon for information on the Novo Diaphragm Pump.

# NOVO

## ENGINE COMPANY

Also a member of A.E.D.



Engines

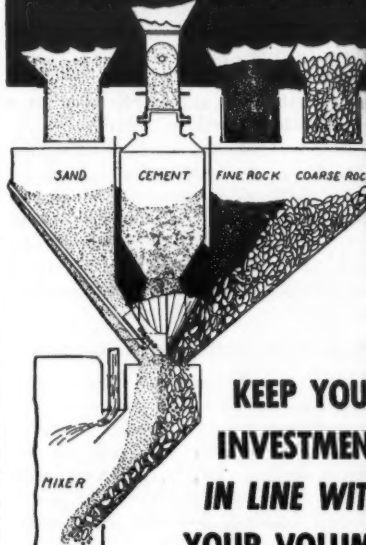
By eliminating the old fashioned Walking-Beam, Novo engineered the ideal Diaphragm Pump On Novo Diaphragm Pumps, the Walking-Beam is replaced



# JOHNSON

## Step-by-Step

### TRUCK MIXER PLANTS



Here's how to plan a central mix plant that holds your initial investment to a minimum, but makes expansion easy and economical. Diagrams at left and right show how a 30 yard Johnson Step-by-Step Bin can be progressively enlarged to 60 yards and 120 yards... without discarding a dollars worth of the original plant.

**KEEP YOUR INVESTMENT IN LINE WITH YOUR VOLUME**

The Johnson Concentric Aggregate-Cement Batcher (see diagrams above) gives your plant the important advantage of (1) Pre-mixing, (2) Pre-shrinkage, (3) Faster Discharging, (4) Elimination of Cement Dust and Mixer Gumming, (5) Centralized Control. Patented design assures a full capacity mixer charge by accurate intermingling of aggregates with the cement when discharged. Many other exclusive capacity-increasing, time-saving, profit-boosting features.

When planning a mixing plant, it will pay you to get all the facts on Johnson Step-by-Step Plants. Write us for details.

30-Yard  
2 Material Bin

60-Yard  
3 or 4 Material Bin

120-Yard Bin

## The C. S. Johnson Company

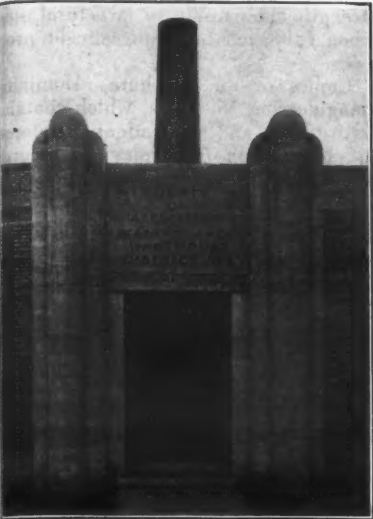
Champaign, Illinois



# FOR VICTORY

BUY UNITED STATES  
WAR BONDS AND STAMPS





The main entrance to the warehouse at Blawnox, Penna.

## Well-Planned Garage In Allegheny County

(Continued from preceding page)

stock of parts is maintained because of the big stocks carried by the large number of distributors in the Pittsburgh area. It will be noted that there is a minimum of repair equipment at this garage. This is due to the fact that lathes and other machine tools are maintained at the South Side Garage operated by the Bureau of Motor Vehicles. This makes for economy, as few mechanics are employed and these are kept busy all the time.

On the front of the garage, adjacent to the repair shop, is the battery-charging room, where two Westinghouse Rectigon chargers are installed. This room is also used for the storage of spare tires. None of the equipment in the district carries a spare tire at the present time because of the chances of theft. Next to this room is a cement storage room and then the stock room. There is a very small stock of tools maintained in the district garage, as most of the hand tools are distributed throughout the district in locked tool boxes. Within the stock room is the storekeeper's office, where the stock of hand tools is maintained on racks and from which all tools are issued on requisition.

In the corridor between the office and the garage on opposite sides are a men's room and a shower room with lockers. The lockers have not been installed as yet because the order was placed just at the time that restrictions were imposed on the use of steel for such purposes. In the boiler room in the basement are two mechanically stoked steam boilers, providing heat for the garage and office building in winter. A lunchroom is maintained in the basement, with a gas range which was used in the old days to whip up a meal when the men came in from snow-plowing. Adjacent to this is another small lunchroom used by the sign painters, who built their own lockers from a gypsum wall board and 2 x 4's.

### Outside Storage

At the rear of the garage is a 55-foot-wide asphalt parking apron, running the full length of the garage and some 50 feet beyond. In this area are two gas pumps for dispensing gasoline to equipment. Large equipment, such as a Bay City and a Lorain 77 shovel, is stored in

the yard when not in use in the district. It is planned to build an elevated loading platform in the yard to permit quick loading of heavy equipment on trucks.

### Personnel

The Government of Allegheny County is vested by law in a Board of County Commissioners, consisting of John J. Kane, Chairman, George Rankin, Jr., and John S. Herron. Under the Commissioners, the responsibility for the design, construction, and maintenance of all county roads and bridges, as well as tunnels, is delegated to the Department of Works, of which John B. Sweeney is Director and Levi Bird Duff is Chief Engineer. George L. Tenney is General Superintendent of the Bureau of Maintenance. Joseph White, Traffic Engineer, is in charge of the Division of Signs and Safety, and E. J. Stotler, Jr., is Superintendent in charge of the Division of Landscape. Roy C. Huntsman is Division Superintendent; Milton Schwemm is Foreman in charge of Road Maintenance, District No. 2; and J. B. Noonan

is Acting Supervisor in charge of heavy-equipment maintenance and repair.

### Stop Accidents!

There was an accidental death every six minutes and an injury every three and a half seconds in this country during 1942, the National Safety Council reports in its 1943 edition of "Accident Facts". Occupational deaths occurred in 1942 at the rate of one every 19 minutes, and occupational accidents every 31 seconds. Every 18 seconds someone suffered a fatal accident at home, and every 7 seconds there was a non-fatal accident in someone's home.

Since most of these accidents are the result of carelessness or thoughtlessness and therefore could be prevented, it is apparent that these are far more dangerous enemies than the Germans and the Japanese. If we approach the job of accident prevention with the same zeal and fervor shown for the war effort, the number of accidents in this country can be sharply reduced.

*The Bridge went UP.*

Thomas A. Edison Bridge, New Jersey

*but*

**RICHMOND**  
FORM-TY ENGINEERING

*kept FORM costs down!*

**RICHMOND 10-WAY SAVING PLAN**

- 1—Provides all kinds of form-tying devices to choose from.
- 2—Economizes because Form Ties cost less to use than wire, band or rod ties.
- 3—Supplies Form Ties engineered for safe working loads of 1,500, 30,000 lbs.
- 4—Assures faster erecting and stripping plus big lumber savings.
- 5—Promotes perfect alignment for correct wall thickness.
- 6—Protects job against rust staining with "1 to 3 inch cutback".
- 7—Saves shipping and handling costs because of scientifically reduced weight.
- 8—Is only known prevention against termite destruction.
- 9—Enables you to borrow working parts and to pay only for ties in the job.
- 10—Is planned from job plans to use the right size of ties and the least number of ties to fit forming for fast, safe work.

**Whether you are planning, designing or estimating on a concrete job—large or small—there are Dollars to be saved on Form Work by planning.**

**Richmond Services to Architects, Engineers and Contractors include recommendations on Form Tying Devices. Consultation on Form problems and Forming used, as well as Estimates on requirements, all without obligation.**

**The list of big jobs on which Richmond Form Ties have saved on form-work costs and speeded up completion is a blue-ribbon list of modern construction. It includes mammoth projects everywhere—and small contracts, too. There is a Richmond Tie engineered for every type of concrete construction. We plan a Tie to fit the work.**

**For information, write to our Planning Division.**

**RICHMOND SCREW ANCHOR COMPANY, INC.**  
816 LIBERTY AVENUE • BROOKLYN, NEW YORK  
Established 1911

**DRAGLINE PRODUCTION TIP NO. 2**

**PICK UP THE BUCKET AS SOON AS LOADED!**

**DRAGGING A FILLED BUCKET CAUSES EXCESSIVE BOTTOM WEAR AND WASTES TIME... GET IT UP AND OUT FOR PROFITS**

● Within 1 or 2 bucket lengths, a Page AUTOMATIC Dragline Bucket digs, fills and carries a full pay load. Size for size and weight for weight a Page AUTOMATIC will OUT-DIG any other dragline bucket model!

**PAGE**  
*Automatic*  
**DRAGLINE BUCKETS**

PAGE ENGINEERING COMPANY, CHICAGO 38, ILLINOIS

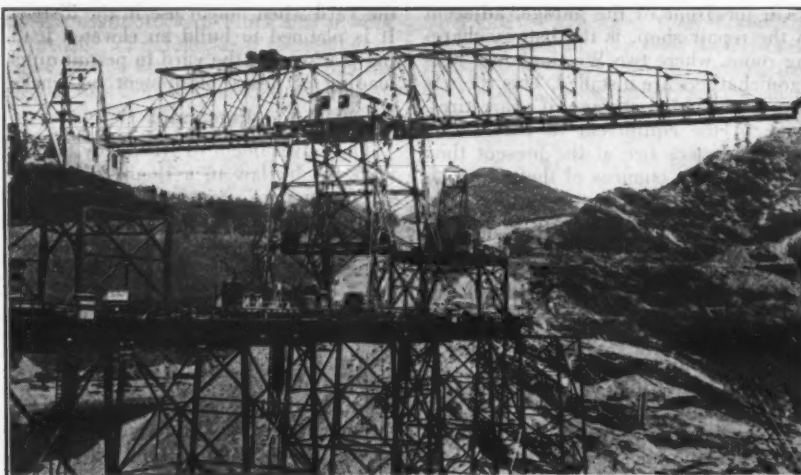


## G-E Announces New Electric Hoist Drive

A new electric hoist drive for cranes, the important feature of which is an exciter embodying a cross-flux principle, has been announced by the General Electric Co., Schenectady, N. Y. Although this new system is not designed for use in all types of hoists, it has already been successfully applied to two high-speed high-lift cranes at the TVA Fontana Dam, near Fontana, N. C., which place concrete at the rate of almost 8 tons a minute.

This new electric drive system not only automatically "weighs" the load so that it is hoisted and lowered at the maximum safe speed, but also prevents the handling of dangerous overloads, G-E engineers report. Safety features inherent in the fields and circuits of the system enable it to provide this degree of control without the use of mechanical relays or similar devices. The equipment consists of a generator, a cross-flux exciter, and an ordinary constant-voltage exciter driven by an induction motor or, if preferred, by a synchronous or a dc motor. This hoist motor is of the type which is standard for high-speed crane-hoist installations, except that it has a non-standard main field for a variable separate excitation.

The cantilever gantry cranes at Fontana Dam which are controlled by this drive system have a maximum lift of 295 feet and, at the extreme outward travel of the rack, the overhang of the hoisting hook at the end of either cantilever is 128 feet beyond the supporting tower. During one period of the construction schedule at the dam, it is reported that one of these cranes picked up a 26,000-pound bucket of concrete from a railroad car running between the legs of the crane tower, hoisted it sufficiently to clear the side rails, racked it out the



One of the two cantilever gantry cranes equipped with General Electric's new electric hoist drive, which are being used for concrete placing at Fontana Dam, N. C.

required distance, and lowered it at 350 fpm to the block being poured. After dumping, the 10,500-pound bucket was hoisted at 670 fpm and landed on the car to be returned to the mixer.

### Brochure Enumerates Advantages of Aluminum

The expansion program of the aluminum industry has reached the point where military needs have been met and the metal is again available for civilian use, subject to WPB approval, according to word from the Aluminum Co. of America, which presents an attractive brochure outlining the uses of aluminum in industry. One instance is cited where the heavy metal of a bridge floor was replaced with aluminum, thereby relieving the bridge of overweight and increasing its life-span by a quarter century. Aluminum provides high resistance to corrosion, and the use of aluminum paint on structures makes them weather and rust-

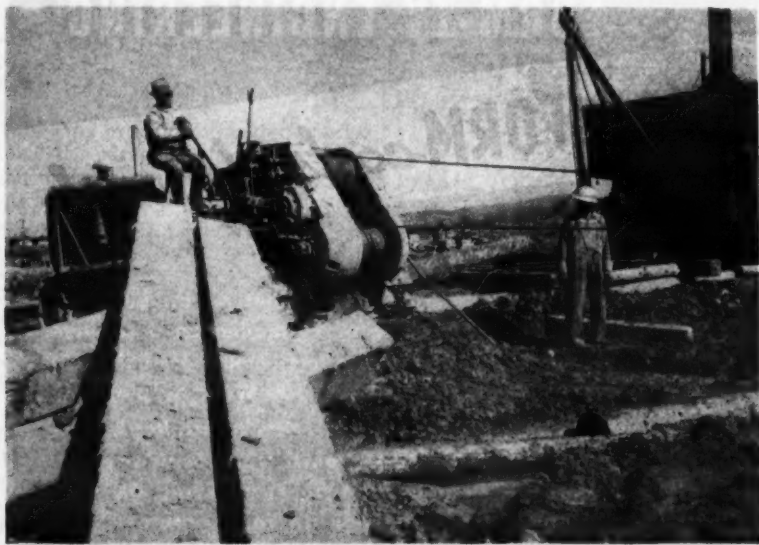
resistant. A number of high-strength aluminum alloys have been produced, and it is stated that certain of these aluminum alloys develop a tensile

strength comparable to structural steel when subjected to heat-treatment processes.

Copies of the brochure, Aluminum Imagining Notebook, which contains information and illustrations of interest to construction men, may be secured upon request to the Aluminum Co. of America, Pittsburgh 19, Pa., by referring to this item.

### Roadside Projects In Ohio During 1943

During the calendar year 1943, there were 153,005 miles of roadside improvement completed in Ohio by contract, 46,904 miles of planting by state forces, and 105.90 miles of seeding along Ohio highways. This makes a total of 305,809 miles of work to improve conditions along highways in this state, principally to eliminate erosion of slopes. Prior to 1943, a total of 2,210.35 miles of roadside-improvement operations had been carried out in the state.



**Tough construction jobs call for versatile construction machines**

## A HYSTER---



--- equipped "Caterpillar" track-type tractor has a multitude of uses—it's twice as useful as a tractor without a hoist. And the HYSTER doesn't interfere with the use of the tractor for regular drawbar or dozer work.

Double drum tractor donkeys, single drum towing winches, and tractor cranes for all "Caterpillar" sizes. Distributed and serviced by "Caterpillar" dealers everywhere.

**LARGEST MANUFACTURERS OF TRACTOR HOISTS AND WINCHES**  
— Over 20,000 In Use —

#### FACTORIES

2952 N. E. Clockamas—Portland 8, Oregon  
1852 North Adams — Peoria 1, Illinois

**WILLAMETTE**  
**HYSTER**  
**COMPANY**

**"ON THE DOUBLE!"**

Each day's advance toward Tokyo and Berlin sees a quickening of the pace... an ever-increasing demand for every man and machine to take it "on the double!"

For years now, fast, mobile Insley Excavators have been accustomed to working "on the double"... accustomed to handling the tough jobs in the tight spots where speed, stamina, and economy are essential.

That's why Insley Excavators now are so in demand on every fighting front... and that's why, too, you will want an Insley Excavator after the war to handle your dirt moving assignments.

**INSLEY**

EXCAVATORS • CRANES • BUCKETS • CARTS

CONCRETE PLACING EQUIPMENT

**INSLEY MANUFACTURING CORPORATION**  
INDIANAPOLIS 1, INDIANA





The White Universal Level-Transit as a level and, in circle, as a transit.

## Transit-Level Unit For Surveying Jobs

A feature of the Universal Level-Transit made by the David White Co., 320 W. Court St., Milwaukee 12, Wis., is the fact that this one instrument serves both as a transit and, with the telescope locked against vertical movement, as a level. Especially designed for highway and heavy-duty construction surveying, this instrument is equipped with a high-powered telescope which brings into focus objects up to 1,500 feet distant. It is 12 inches long and is arranged optically so that it is possible to read the figures on a rod  $4\frac{1}{2}$  feet from the center of the transit. The unit also is equipped with a clamp and tangent screw to both the horizontal and the vertical circle. A quadrant reads the vertical arc to 46 degrees above or below the center; divisions are marked in degrees in 90-degree quadrants and a vernier provides for adjustment to 5 minutes. The telescope frame rides on a  $4\frac{1}{2}$ -inch horizontal circle, the frame projecting over the edge of the circle to protect it.

Another feature of the Universal Level-Transit's design is the ball-bearing race to assure perfect adjustment under the most severe conditions, and prevent drag or tightening in sub-zero temperatures. Standard equipment with the Level-Transit includes a tripod, sunshade, adjusting pins, plumb bob, and hardwood carrying case.

Bulletin No. 1039, describing this Universal Level-Transit as well as the highway engineers' dumpy level and other White surveying instruments, may be secured by interested contractors and state and county highway engineers and surveyors direct from the manufacturer.

Invest in Victory! Back the Attack with more War Bonds!

## Madeline Works Hard For Uncle Sam's Boys

When the Germans moved out of the Kasserine Pass in North Africa, with the Allied forces in pursuit, one of the biggest jobs confronting our men was rebuilding the bridges destroyed by the Germans as they retreated to the Tunis area, where they made their last stand before surrendering. One platoon engaged in the reconstruction work was ably assisted by "Madeline", so named by a crew member after his girl back home. The Madeline in North Africa is a 3-cylinder compressor powered by a 4-cylinder gasoline engine, all mounted on a standard GMC  $2\frac{1}{2}$ -ton 6 x 6 Army truck, and she has proved a versatile, thorough and faithful worker. Besides breaking concrete, digging deadman holes for foundation anchors, driving rivets and tamping earth, Madeline performs odd jobs like providing air for the forges which heat the rivets, and cutting rivets in taking apart wrecked bridges.

The first task on the Kasserine Pass assignment was one of the biggest bridge jobs performed by the Allied forces in North Africa—taking apart and moving for reassembly elsewhere a 212-foot two-span through-truss railroad bridge which had been thoroughly battered by the Germans. Working conditions were very trying, as the country offered no shade from the sun, and the sand, dust and hail storms were intense. The men worked 8-hour shifts on a 16-hour schedule, but Madeline worked both shifts.

The next move was to the Bizerte-Mateur area, scene of the final American victory in Tunisia. Madeline came through the mine hazard without injury, and survived the air raids during the Sicilian campaign. She is very popular, is in constant demand to give a lift on various jobs, and has not once required a major overhaul. The thousands of military trucks built by GMC Truck & Coach Division for the different branches of the Service are proud to be members of the same family as Madeline.

**WELLMAN WILLIAMS TYPE BUCKETS**

## Dig Deep and Bite Clean

Wellman Buckets, in Power Arm and Multiple Rope Types develop great digging power. They bite into frozen ground, hard clay, or shale, and come up with full loads.

**WELDED ROLLED STEEL CONSTRUCTION**

For Greater Strength and Longer Life

Welded design which made Wellman Buckets so universally preferred for heavy duty in steel plants and dredging, is now featured in all Wellman-Williams Clamshell and Dragline Buckets— $\frac{3}{4}$  to  $18\frac{1}{2}$  yd. capacities.

**SEND FOR FREE BULLETIN**

Tell us about your particular requirement and we will send full description of construction and features in special bulletins which clearly prove why YOUR NEXT BUCKET SHOULD BE A WELLMAN.

**THE WELLMAN ENGINEERING COMPANY**  
7012 Central Avenue • Cleveland 4, Ohio  
Sales and Service Agencies in principal cities



CHECK THESE *Extra* USES for BLACKHAWK PORTO-POWER PIPE BENDERS



### All-Directional Handy Jack

Porto-Power rams operate at any angle to do 1,001 tough jobs easily, safely and fast! Operator is always safely away from danger zone.



### Lift Heavy Machines

Cumbersome machines raised from low of  $3\frac{1}{2}$  in. to 8 $\frac{1}{2}$  in. height—speedily, safely with Porto-Power.



### Build Your Own Press

Your Blackhawk Pipe Bender power unit can be used in a press. Free blueprints give you directions.



### Porto-Power Pulls Shafts and Pulleys

The same power unit furnished in the Blackhawk Bender lifts these tough jobs easily.

GET all the usefulness out of your Blackhawk Porto-Power Pipe Bender! Sure, it bends pipe up to 4 in. Also, it can be removed from the bending frame to serve as a powerful jack—or with standard attachments to pull, push, spread, press, lift and lower—easily, accurately, safely and fast!

Porto-Power is fast becoming indispensable hydraulic service equipment in maintenance and electrical work, production plants, shipyards, construction companies and repair service organizations.

If you have a Blackhawk Pipe Bender be sure you know all its uses. If you'd like to have one, call your industrial supply distributor or write Blackhawk for complete information on Porto-Power in 7, 10, 20 and 50-ton capacities.

## BLACKHAWK

BLACKHAWK MFG. COMPANY  
Dept. P1854, Milwaukee 1, Wisconsin  
Rush new Hydraulic Equipment Bulletin V-43 to us.

Name.....

Company.....

City..... State.....

## HERE'S A PARTIAL LIST OF SUBJECTS—

### ON OPERATION

Proper handling of Operating Controls  
Unloading the Paver  
Preparing the Paver for the Job  
Adjustments  
The Hydraulic Control System  
Cold Weather Operation  
Storing the Paver  
Lubrication

### ON MAINTENANCE

General Maintenance  
Repacking Transfer Chute Bearings  
The Water System  
Cleaning Valves—Replacing Parts  
Servicing Hydraulic Control System  
Replacing Bushings and Bearings  
Replacing Cables—Proper Reeling  
Cleaning Clutch and Brake Bands

### ON PARTS

Complete listing of all parts by assemblies  
Clear, understandable illustrations

*Proper Maintenance  
paves the way to  
Bigger Profits*



TO HELP all Ransome 34E Dual Drum Paver owners take better care of their machines, get longer life, and best service, we offer this comprehensive 100 page Operation and Maintenance Manual. A few of the many subjects covered are listed at the left... If you own or contemplate owning a Ransome Paver, you are invited to write for your copy of this helpful time-and-money-saving book.



CONSTRUCTION EQUIPMENT DIVISION  
**Ransome. MACHINERY COMPANY**  
DUNELLEN, NEW JERSEY

SUBSIDIARY OF WORTHINGTON PUMP AND MACHINERY CORPORATION



## North Carolina Curbs Damage to Roadsides

(Continued from page 72)

way must be removed therefrom. In many instances in wooded areas it will be desirable to leave herbaceous plants uncut, if cutting is done during the growing season; but whenever such growth is cut, it may be left on the highway right-of-way where it falls, and not raked up into piles or windrows.

6. When permission is given to trim a specimen tree on the highway right-of-way, such trimming is to be done in accordance with generally accepted horticultural practices and any trimming necessary to leave the tree with a good balanced appearance must be done in addition to the minimum trimming needed for line clearance.

### Clearing Practices

Under the heading "Suggestions for Clearing Practices on Utility Rights-Of-Way", the Committee has issued a five-point statement with the introduction that utility corporations can contribute much to highway appearance and also make their own maintenance easier if, in addition to the above regulations, they will adopt the five points of good practice listed below on their own rights-of-way.

1. Save low-growing and slow-growing plants, as required on the highway right-of-way.

2. Cut close to the ground to avoid any unsightly stumps.

3. Avoid windrowing or piling of cuttings.

4. Remove from rights-of-way any cuttings larger than trees approximately 5 feet in height. If such cuttings cannot be hauled away or burned, they may be placed on the ground outside of the utility right-of-way, with butt ends to the highway.

5. Leave herbaceous plants uncut wherever feasible in wooded areas, unless right-of-way cutting is done during the winter, when such growth should be cut.

### Chile Plans for New Trans-Andean Highway

The construction of a new highway, to link the southern lake region of Chile with Argentina's Nahuel Huapi National

Park, has been ordered by Chile's Minister of Public Works, according to a report in the newspaper *Ercilla* of Santiago.

The highway will start at the Chilean city of Osorno and will follow the existing highway 70 miles eastward to the hot springs at the eastern end of Lake Puyehue. Here, 700 feet above sea level, the Chilean Government has built a modern resort hotel which, by the extension of the highway across the Andes, will be made accessible to visitors from Argentina. On the Argentine side of the 4,200-foot pass which marks the border between the two republics, connections will be made with the present highway to Bariloche, the terminus of the Argentine State Railways.

The present international highway, between Lake Todos los Santos in Chile and Lake Frías in Argentina, crosses the border at a point about 30 miles to the south of the new highway.

### Master Generator Plants In Eleven Basic Sizes

Gas-electric generator plants for supplying power for electric tools and for lighting on small and large construction jobs are described in a brochure just received from the Master Vibrator Co., 200 Davis Ave., Dayton 1, Ohio. These plants are available in eleven basic sizes from 500 to 17,000 watts, in thirty different types to meet ac or dc power or lighting requirements, and can be furnished with wheelbarrow, buggy, trailer or skid mounting. The catalog includes photographs of individual models with a brief description and indication of the operations for which each is best suited. Also included are complete tables of specifications, and an informative section on the selection of the proper generator plant for a given job.

Copies of Bulletin No. 594 may be secured by interested contractors and highway engineers direct from the manufacturer. Just mention this item.

### LeTourneau Names Seven In Dealer Organization

In line with a new policy for an exclusive distributor organization, R. G. LeTourneau, Inc., of Peoria, Ill., has announced the appointment of the following dealers: Loggers & Contractors Machinery Co., Portland, Ore.; The Victor L. Phillips Co., Kansas City, Mo.; The Nicoll-Talcott Corp., Hartford, Conn.; Wylie-Stewart Machinery Co.,

Oklahoma City, Okla.; General Supply & Equipment Co., Inc., Baltimore, Md.; Tri-State Equipment Co., Memphis, Tenn.; and General Supply Co. of Canada, Ltd., Ottawa. All of these dealers have or plan to have complete branch headquarters within their respective sales and service areas and the only prod-

ucts handled in addition to the LeTourneau line will be those of non-competitive manufacture.

Victor L. Phillips of the Victor L. Phillips Co., and A. Freeman Sersanos of Loggers & Contractors Machinery Co. are past presidents of the Associated Equipment Distributors.



## LACLEDE HIGHWAY STEELS

**WIRE MESH**

Slab reinforcement keeps cracks closed and holds slab together.

**DOWEL SPACERS**

Assures correct alignment and simple installation of shear dowels.

**CENTER JOINT**

For controlling longitudinal cracking of pavement.

Specify Them!!

REPORTED HIGHWAY RESEARCH INDICATES STEEL REINFORCEMENT IS NECESSARY IN PAVEMENTS FOR LONG LIFE AND LOW MAINTENANCE.

LACLEDE STEEL COMPANY

ST. LOUIS, MISSOURI



There's a story behind this picture!

## MILLIONS OF GALLONS A DAY! ... the GRIFFIN Wellpoint Way

Four GRIFFIN Model 108, 10", 2500 G.P.M., Wellpoint Pumps, each discharged through 50' of 8" pipe, into the ditch in the above picture. The predrained cut *BEHIND* the spoil-bank is 15' *BELOW* water level in the ditch—but not one drop could filter back through the Wellpoint System which was protecting the dry working area.

**FOR SALE AND FOR RENT**

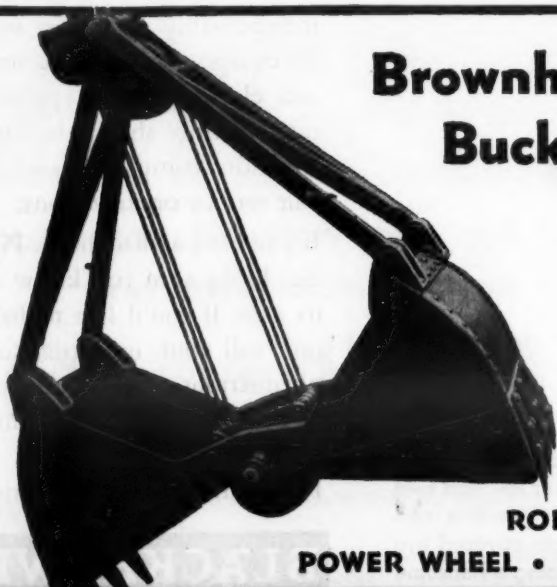
### MID-WEST

GRIFFIN EQUIPMENT CO., INC.  
548 Indiana Street • Hammond 1662  
HAMMOND, INDIANA

### SOUTH

GRIFFIN ENGINEERING CORP.  
633 N. Myrtle Ave. • Jacksonville 5-4516  
JACKSONVILLE, 4, FLA.

**MAIN OFFICE: 881 EAST 141st STREET, NEW YORK 54, N. Y.**  
**GRIFFIN WELLPOINT CORPORATION**



## Brownhoist Buckets

**ROPE REEVE •  
POWER WHEEL • LINK TYPE**

Handling ore, gravel, coal or dirt Brownhoist Buckets do a better job because: 1) Larger sheaves reduce rope wear, 2) Heavy carbon-steel digging lips take deep clean bites, 3) Extra-sturdy construction insures long-life. Write to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York, Philadelphia, Pittsburgh, Cleveland and Chicago.



## Effect of Aviation On Future Highways

(Continued from page 71)

airport development is in the offing. The Administrator of Civil Aeronautics, who has primary responsibility in this field, has frequently spoken of this problem. The development of the automobile has brought with it the development of roads. Our investment during the period from 1920 to 1941 in over 1,500,000 miles of highways which have been surfaced has amounted to over \$30,000,000,000. This has been a gigantic undertaking. The compelling necessity for this program is indicated by the fact that during that period the number of motor vehicles increased from 9,000,000 to 34,000,000 and total travel, as indicated by gasoline consumption, increased 534 per cent.

### Better Highway Facilities

The development of airports, landing strips, and whatever other landing-area designs may be worked out is in one respect very closely related to the road planning which will be undertaken from time to time in the future. In order to realize the greatest usefulness of both roads and airports, they must be closely connected with through highways so that a minimum of time is lost in getting to and from the airport or landing field with the automobile. If the type of sky-car is developed which permits operation on the roads after landing, there must be a quick contact with the main highways from the landing areas used. In addition, a great deal of the archaic and grown-up-like-Topsy arrangement of our outlets from large cities will have to be worked out so that through traffic can get to and from the airports and main highways with a minimum of delay. The system of being held up by pedestrians crossing a road at the risk of their lives and of the hazardous right-angle cross traffic will have to be eliminated. There certainly would seem to be no room for parking along the sides of through highways to and from main airports, thus increasing the hazards that that practice always offers. We may be approaching the time when the Norman Bel Geddes type of highway for this country, as created in the General Motors Futurama at the New York World's Fair, will not be just a dream but will be something that we will be demanding and will be building for ourselves.

From a paper presented before the Association of Highway Officials of the North Atlantic States in New York City, February 17, 1944.

### New Bulletin Describes Heavy-Duty Compressors

The Sullivan line of heavy-duty two-stage stationary compressors is described in a new 56-page two-color bulletin. The line includes the WN-112 2-cylinder V-vertical type, available in five sizes from 378 to 914 cfm; the WN-114 4-cylinder semi-radial type, which comes in five sizes from 1,092 to 1,828 cfm; and the

twin units WN-112 and WN-114, which have a common double-shaft motor so that one or both compressors may be used as required, and are made in four sizes, from 960 to 1,828 cfm and 2,184 to 3,656 cfm respectively. The bulletin includes illustrations of many installations, and descriptions of available sizes,

types, drives and construction details, as well as information on foundation requirements, regulation, accessories, and servicing.

Copies of Bulletin A-52 will be sent upon request to the Sullivan Machinery Co., Michigan City, Ind., and mention of this magazine.



are carrying loads in all climes where off-the-highway operation is required.

- Ruggedly constructed and amply powered for the toughest going.
- From 5 to 20 tons capacity.

THE LINN MANUFACTURING CORPORATION  
MORRIS, NEW YORK

**Alert Contractors!**  
Buy the  
**JACKSON**  
Hydraulic  
Concrete  
Vibrator  
for Dependable, Speedy  
Performance

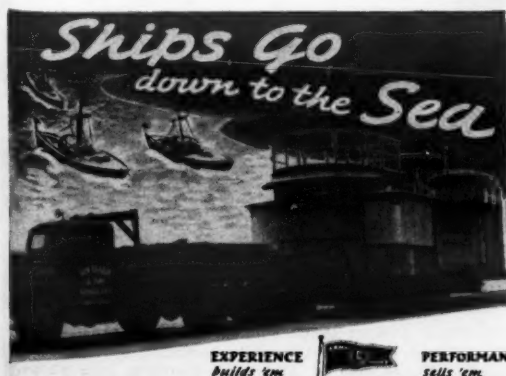
- Automatic pressure lubrication—requires no attention.
- 34-ft. hose—2 3/4" vibrator head.
- Adjustable frequency to 6800 R.P.M.—submerged in concrete.
- Powerful gas engine—4.7 H.P.
- Long-lived, ball-bearing, rotary, hydraulic pump.

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24 HOURS A DAY  
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LUDINGTON, MICHIGAN

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AMERICA'S shipbuilding industry will launch more ships in 1944 than all the rest of the world combined. ROGERS TRAILERS are a vital link in the mass-production method of ship construction for they are transporting heavy machinery . . . boilers, bulkheads, engines . . . speeding Victory ships down to the sea!

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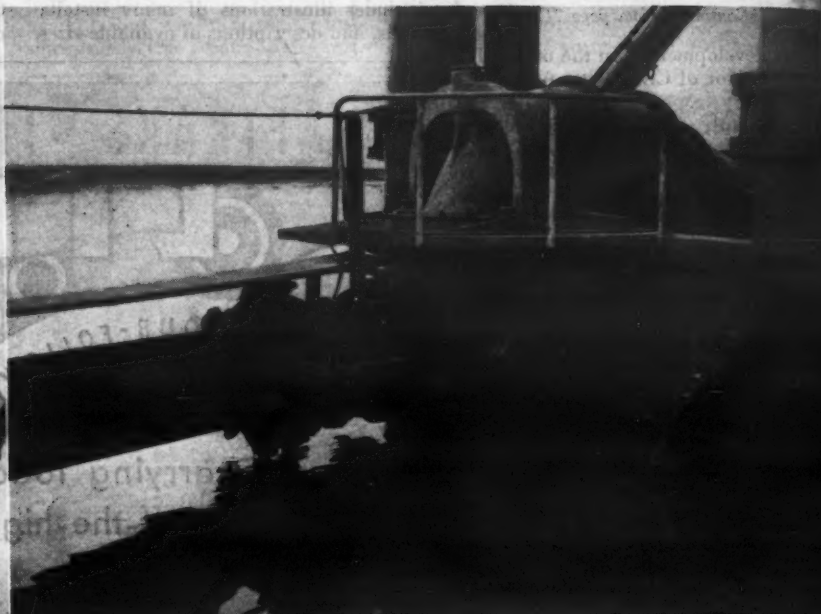
ROGERS TRAILERS are serving efficiently on the home-front too and new models which will be available when war contracts are completed, will be even more efficient than the multitude which have been so successfully operated by industry for many years.

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ALBION,  
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# Contractors and Engineers Monthly



## U. S. Engineer Photos

The dredge Los Angeles of the Standard Dredging Co. is now completing a harbor dredging contract on the West Coast, entered into before the war, stopped because of it, and restarted because of the need for greater harbor facilities. Above left, the starboard side of the Los Angeles; above, the connection between the dredge and the floating line; and left, the special elbow connection in the floating line with the interchangeable elbow mounted on the same pontoon. See page 2.

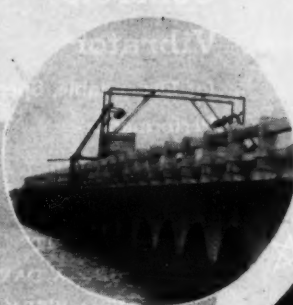
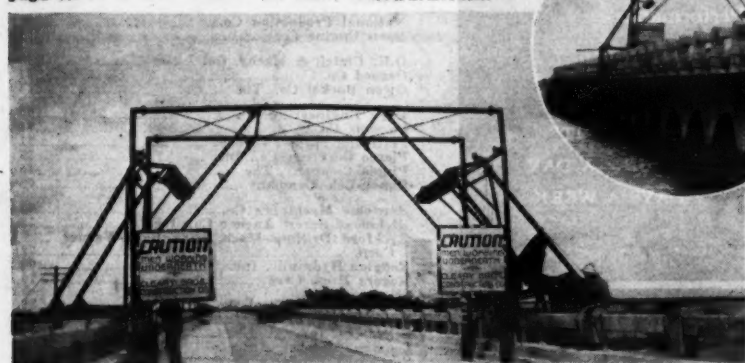


Below, the rubber-tire-mounted tubular-steel gantry used by Cleary Brothers Construction Co. to support underslung platforms for men waterproofing the new exposed concrete and steel on the widening of nineteen bridges on the Key West Highway in Florida. See page 7. C. & E. M. Photos



## C. & E. M. Photo

Water for the paver on Ledbetter & Johnson's access-road job at the north entrance to Mobile, Ala., was brought in by tank truck and delivered to a rectangular tank on skids from which it was pumped to the paver. The tank truck was also used to wet down the dusty subgrade. See page 1.



Left, one of the modernistic district shops and warehouses of Allegheny County, Pennsylvania. Plenty of natural light is provided by ample installations of steel sash. Above, one of Allegheny County's sign shops, well illuminated by both natural and artificial light, where the county's highway signs are made. See page 63.



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ALLEGHENY

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